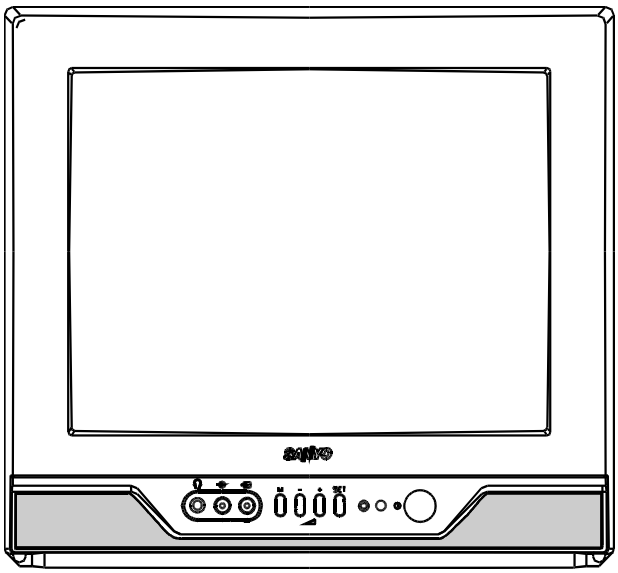
Service Manual

Models: **CE14A2-C**
CE14A2-E
CE14AS2-F

Colour Television



CRT 14” Philips A34EAC01X06

CHASSIS 2112
EC7-A

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Give complete “SERVICE PART No” for parts order or servicing, it is shown on the rating sheet on the cabinet back of the TV set.

Note
This TV receiver will not work properly in foreign countries where the television transmission system and power source differ from the design specifications. Refer to the specifications for the design specifications.

1. Safety instructions

Read this page before doing any operation of adjustment, maintenance or repair the TV set described.

Only skilled personnel of Sanyo Technical Service should do the adjustment, maintenance or repair of TV set.

2. WARNING

For the correct and safe use of the TV set, it is essential that the service personnel follow the process of safety generally accepted and the safety precautions specified in this manual.

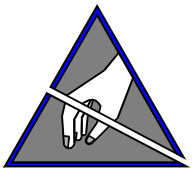
An isolation transformer should be connected in the power line between the receiver and the AC line when a service is performed on the primary side of the converter transformer of the set.

3. Precaution against X-Rays

The primary source of X-RADIATION in the television receiver is the picture tube. The picture tube is specially constructed to limit X-RADIATION emissions. For continued X-RADIATION protection, the replacement tube must be the same type as the original including suffix letter. Excessive high voltage may produce potentially hazardous X-RADIATION. To avoid such hazards, the high voltage must be maintained within specified limit. If high voltage exceeds specified limits, take necessary corrective action. Follow the instructions carefully for +B1 volt power supply adjustment, and high voltage adjustment to maintain the high voltage within the specified limits.

COMPLIANCE TO STANDARDS

All of those marked with ✶ or ⚠ must be replaced with original parts



WARNING! This TV set contains components which are particularly sensitive to static electricity (ESD). It is recommended that all due precaution be taken handling integrated circuits and semiconductors.

4. Recommendations to protect our environment

Stand-by mode: In order to save energy and to maintain an optimum picture quality, it is advisable to switch off the TV using the ON/OFF button located at the front of TV set.

Used batteries: The batteries in the remote control of these models do not contain mercury. However, SANYO recommends that you do not dispose of used batteries in domestic refuse. Please, contact your dealer or your local authorities for information regarding the disposal of used batteries or your nearest collection point.

Recommendation about the end-of-life: These SANYO TV sets have been designed and manufactured using high quality materials which can be recycled and reused. In the future, when the life cycle of these sets come to an end, specialised companies can disassemble it and reuse certain materials. This reduces the impact of waste in our environment. Please, contact with your local authorities for information regarding the disposal of your set when the time arrives. Help us to conserve the environment we live in!

5. TECHNICAL CHARATERISTICS.

Cathode-ray tubes	In-Line, Hi-bipotential gun. 14" (34 cm)
Tuning-system	Voltage synthesis, 100 programs in non-volatile memory, AFT, Fine-tuning (10 first programs), automatic, semiautomatic and manual channel-search. Band I, channels 2-4 (VHF)=E2-E4 Cable channels S1-S20 Hyperband channels S21-S41 Band III, channels 5-12 (VHF)=E5-E12 Band IV-V, channels 21-69 (UHF)=E21-E69
Reception system	B/G Model CE14A2-C B/G-D/K Model CE14A2-E B/G-L-L' Model CE14AS2-F
Colour system	PAL, NTSC 4.43, N.A.P. (NTSC Amusement by PAL)Models CE14A2-C, CE14A2-E PAL/SECAM ntsc 4,43, N.A.P. Model CE14AS2-F
Program selection	Sequential selection from the controls on the set. Direct selection to any program from the remote-control device.
Audio	Power-rating 1W rms. (10% distortion)
Speakers	1 of 8 Ω.
Aerial	External aerial sockets 75 Ω IEC
Jack for headphones	Mono jack 3,5mm.
Clock and alarm Function	
Timer Function	Switch on and off of CTV programmable in real time.
AV connectors	1 Scart connector 21 pin CENELEC standard AV, RGB and S_Video. 1 RCA Video input (frontal) 1 RCA Audio input (frontal)
Power supply	220 – 240 VAC 50Hz
Consumption	47W (maximum consumption). 29W (IEC 107-1) 3,1 W (Stand-by ⏻)
Radio	87.5 – 108MHz. 40 memories. Manual and semiautomatic search
Hotel mode	Hotel mode and Hotel Rental
Options by means of Technical Service: NTSC-M	

6. Safety

It fulfils the safety requirements established in the regulation:

- EN 60065:93

7. EMC (Electromagnetic Compatibility)

It fulfils the EMC requirements established in the regulation:

- EN 55013:1990/A12:1994
- EN 55020:1994
- EN 60555-2:1987

8. CONNECTED DOCUMENTS.

This Service Manual provides the particular information of the models CE14AT2-C, CE14AT2-E and CE14AX2-F and it is complemented with:

1. Service Manual of the CHASIS 2112 (EC7-A).
2. Service Electrical scheme of the model CE14A2-C.
3. Instruction manual.

9. MOUNTED CIRCUITS CODES.

CE14A2-C	CE14A2-E	CE14AS2-F	
6110372809	6110375802	6110375604	Main + Socket TRC PCB's
7110017204	7110018707	7110018608	Main PCB
7040003506	7040003506	7040003506	Socket TRC PCB

10. ABBREVIATIONS USED IN THE PARTS LIST AND CABINET PARTS LIST.

Note : The following abbreviations indicate:		
A2-C	Exclusive parts for	**CE14A2-C**
A2-E	Exclusive parts for	**CE14A2-E**
AS2-F	Exclusive parts for	**CE14AS2-F**

11. CABINET PARTS LIST

11.1. CABINET PARTS LIST OF CHASSIS CE14A2-C Y CE14A2-E

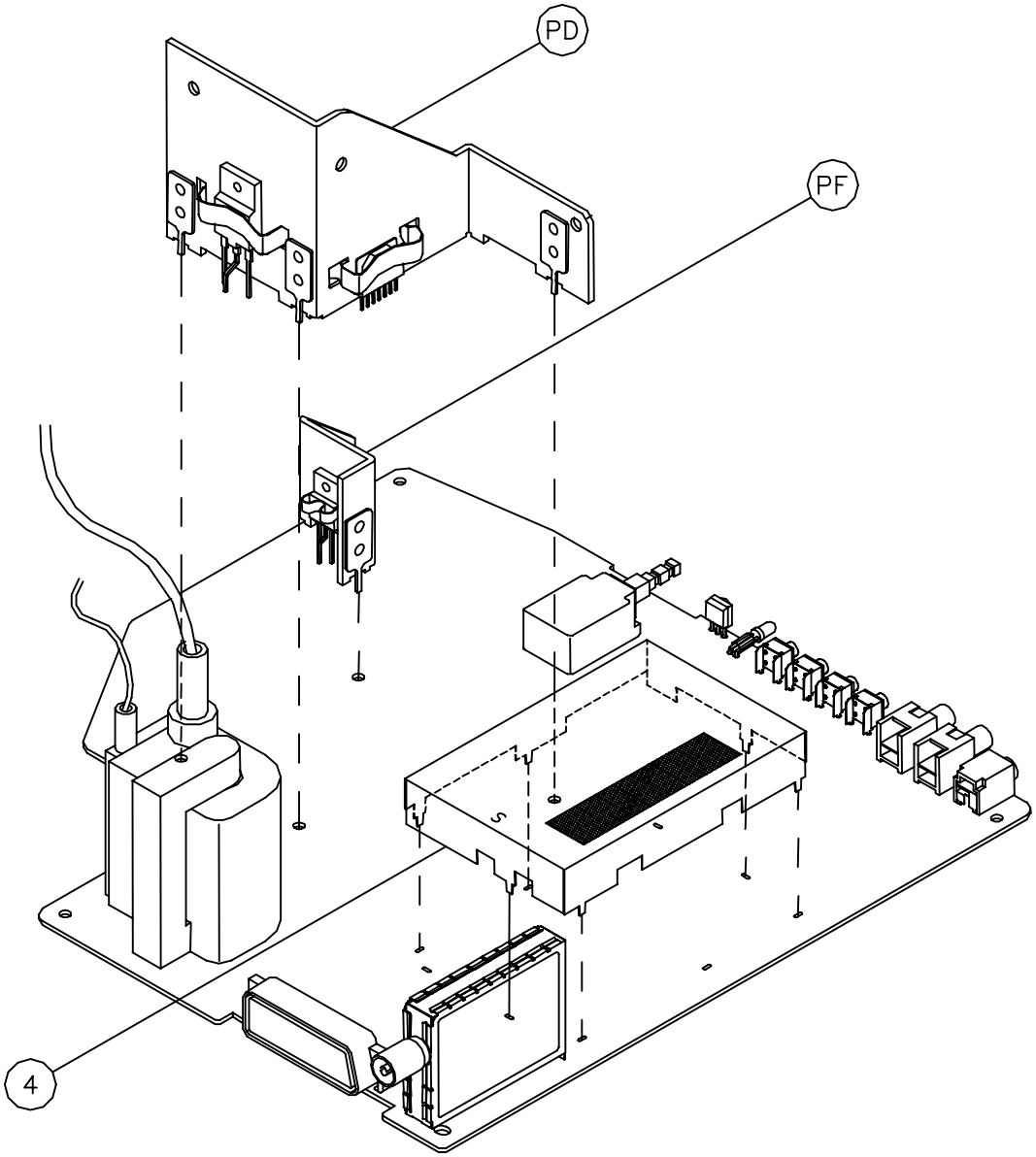
Ref. No.		Part No.	Description
YG4	✶	0080112907	Comp. side IF shield EC7-A

Assy PD (Deflection)

IC701	0360516207	LA7840L
Q650	0360308902	2SD2599
YR701	0200225407	Heatsink Deflection EC7-A
YR702	0010106300	Spring CLIP 56379
YR703	0010106300	Spring CLIP 56379

Assy PF(Power supply)

Q800	0360311005	MOS 2SK3067 600V/2A
YR800	0200225506	Heatsink SOURCE EC7-A
YR801	0010110401	Spring CLIP 56363



11.2. CABINET PARTS LIST OF CHASSIS CE14AS2-F.

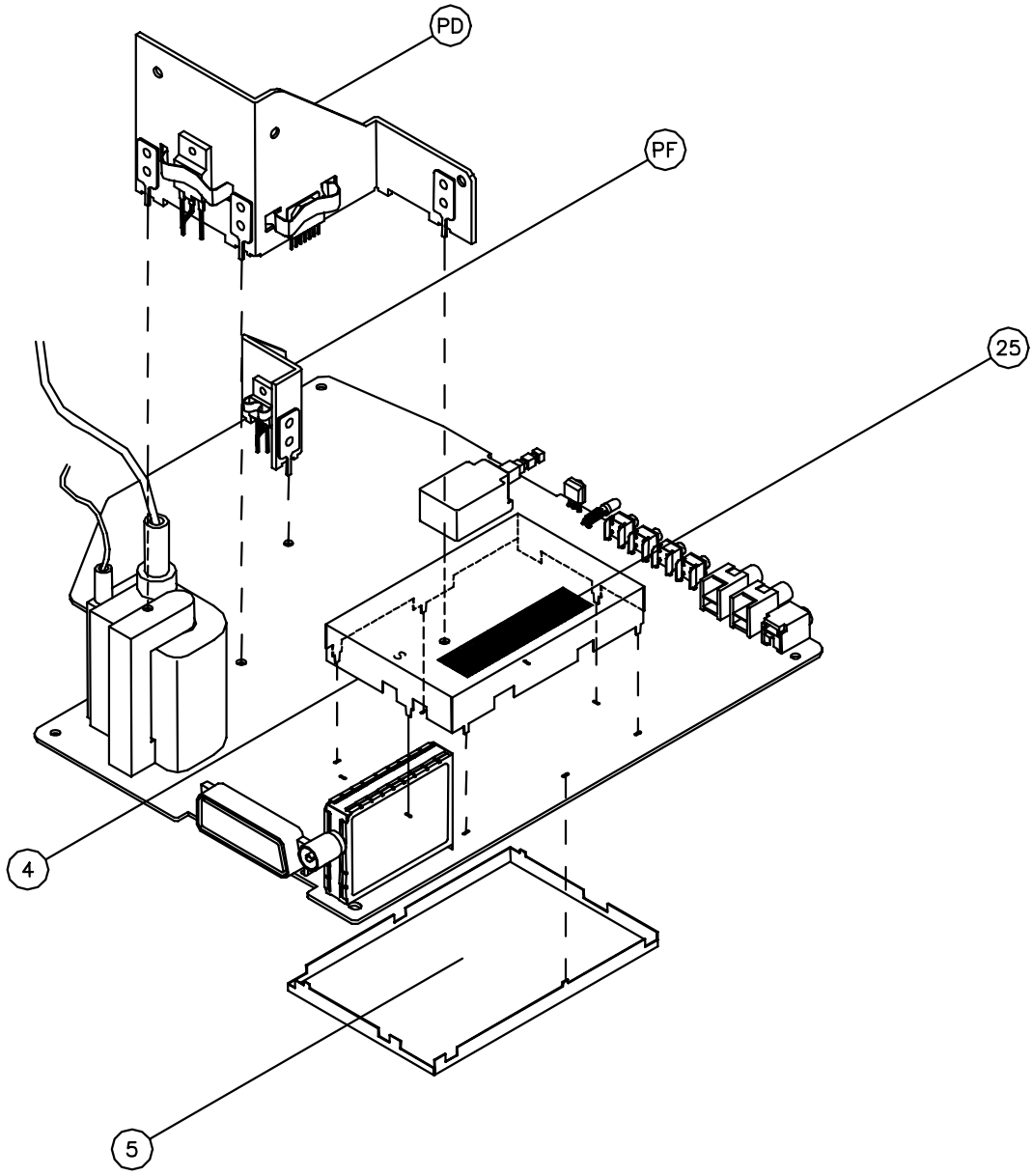
Ref. No.		Part No.	Description
YG4	✶	0080112907	Comp. side IF shield EC7-A
YG5	✶	0080113004	Cooper side IF shield EC7-A

Assy PD (Deflection)

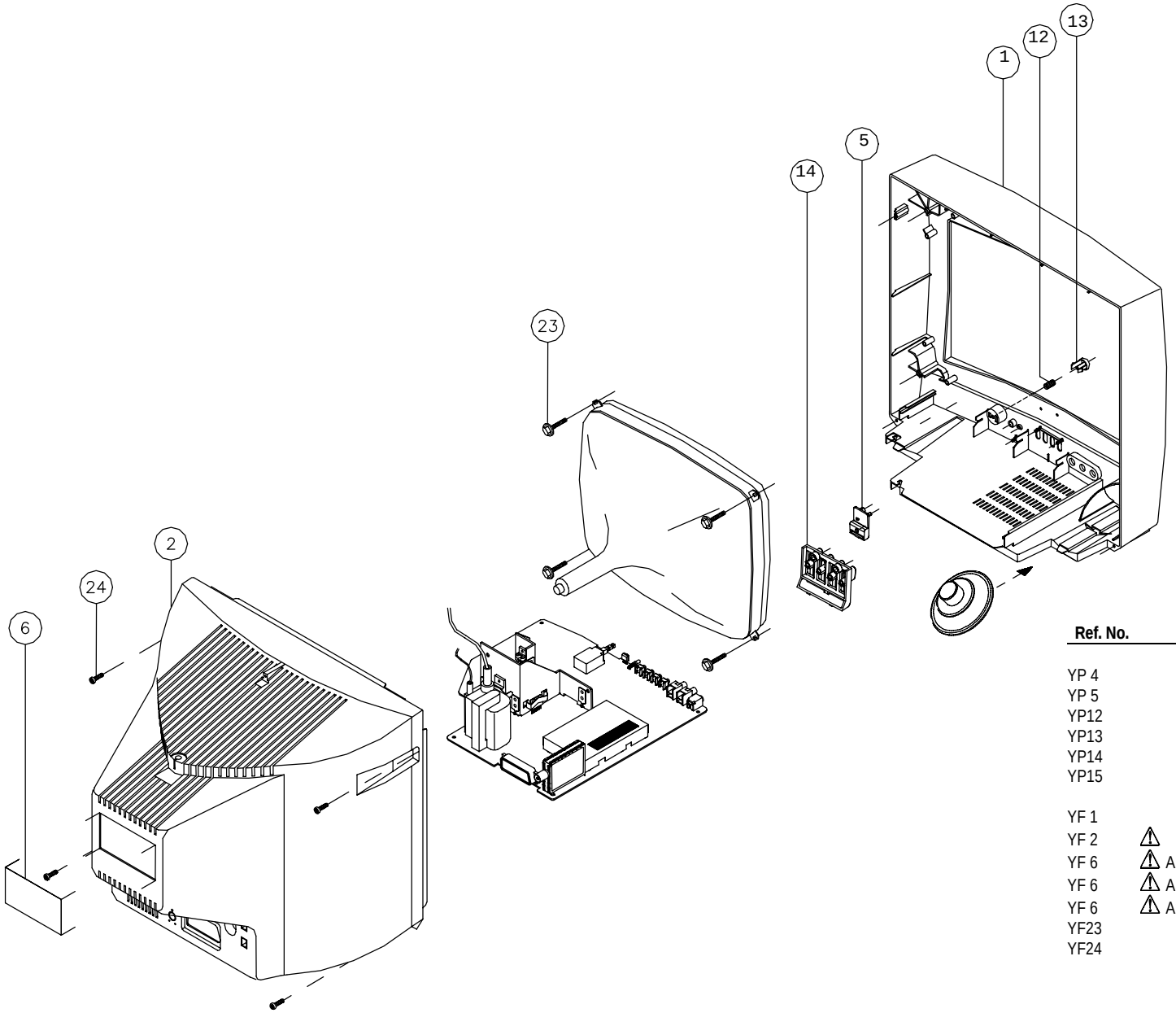
IC701	0360516207	LA7840L
Q650	0360308902	2SD2599
YR701	0200225407	Heatsink deflection EC7-A
YR702	0010106300	Spring Clip 56379
YR703	0010106300	Spring Clip 56379

Assy PF(Power supply)

Q800	0360311005	MOS 2SK3067 600V/2A
YR800	0200225506	Heatsink source EC7-A
YR801	0010110401	Spring Clip 56363



11.3. CABINET PARTS LIST



Ref. No.		Part. No.	Description
YP 4		0020130605	Badge SANYO Columnas Silver
YP 5		0340207711	Trans. Del. Board 14”
YP12		0010106607	Key Spring
YP13		0130214109	Button Power 17" E7E5
YP14		0130214604	PUSHKey Assy 14" E8R8
YP15		0090257700	Degaussing Coil 14"
YF 1		2700049014	Front Cabinet Assy 14" E8R8
YF 2	⚠	0590269411	Back Cover 14" E8R8 AENOR
YF 6	⚠ A2-C	0390246817	Rating Plate CE14A2-C
YF 6	⚠ AS2-F	0390247005	Rating Plate CE14AS2-F
YF 6	⚠ A2-E	0390247203	Rating Plate CE14A2-E
YF23		0890161326	Screw HI-LO 5,8X27 W/Washer
YF24		0890191315	Screw AR 4X15

12. PARTS LIST

PCB SOCKET TRC

Ref. No.	Part No.	Description
CON.FG	0160221107	Polarized Band Gray 4P. 260/6/6
CON.FI	0160260303	Polarized Band Gray 8P. 330/6/6
CON.FK	0640202610	Earth Wire 270 mm.
CAPACITORS		
C501	0230280307	Ceramic SMD 220 pF. 5% 50V. 0805
C502	0230280307	Ceramic SMD 220 pF. 5% 50V. 0805
C503	0230280307	Ceramic SMD 220 pF. 5% 50V. 0805
C504	0270341324	Polyester 100 nF. 10% 250V.
C511	0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C512	0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C513	0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C561	0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C571	0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C573	0240590901	Ceramic 2200pF +80-20% 2KV.
DIODES		
D501	0360601512	SMD LS4148
D502	0360601512	SMD LS4148
D503	0360601512	SMD LS4148
D504	0360601512	SMD LS4148
D505	0360104202	Zener BZX79C6V2
D561	0360605414	Zener SMD BZT55C9V1
D562	0360605604	SMD BAV103 200V 0,25A
D570	0360601512	SMD LS4148
FG1	0330144205	Ribbon Wire Holder 4 P.
FI1	0330163304	Ribbon Wire Holder 8 P.
J500	0470040007	Jumper Lead 0,6 mm.
PCB04 ⚠	0750152415	Socket PCB EC7-A
TRANSISTORS		
Q501	0360161319	BF 422 TPE2
Q502	0360161319	BF 422 TPE2
Q503	0360161319	BF 422 TPE2
Q511	0360160709	BF 423
Q512	0360160709	BF 423
Q513	0360160709	BF 423
Q570	0360321301	SMD BC 857 B
RESISTORS		
R501	0790578140	Metal Oxide 15 KΩ 5% 2W.
R502	0790578116	Metal Film 15 KΩ 5% 2W.
R503	0790578116	Metal Film 15 KΩ 5% 2W.
R504	0790036909	Carbon 1,5 KΩ 5% 1/2W.
R505	0790255004	R.M.G. SMD 22 KΩ T<=5% 0805
R511	0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R512	0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R513	0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R521	0790735203	R.M.G. SMD 510 Ω T<=5% 0805
R522	0790735203	R.M.G. SMD 510 Ω T<=5% 0805
R523	0790735203	R.M.G. SMD 510 Ω T<=5% 0805
R531	0790223002	R.M.G. SMD 47 Ω T<=5% 0805
R532	0790223002	R.M.G. SMD 47 Ω T<=5% 0805
R533	0790223002	R.M.G. SMD 47 Ω T<=5% 0805
R541	0790036909	Carbon 1,5 KΩ 5% 1/2W.
R542	0790036909	Carbon 1,5 KΩ 5% 1/2W.
R543	0790036909	Carbon 1,5 KΩ 5% 1/2W.
R551	0790037709	Carbon 3,3 KΩ 5% 1/4W.
R552	0790037709	Carbon 3,3 KΩ 5% 1/4W.
R553	0790037709	Carbon 3,3 KΩ 5% 1/4W.
R561	0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R562	0790127104	Carbon 100 Ω 5% 1/4W.
R571	0790741805	R.M.G. SMD 1,5 KΩ T<=5% 0805
R572	0790234702	R.M.G. SMD 430 Ω T<=5% 0805
R573	0790529614	Metal Film 2,7 Ω 5% 2W.
R574	0790036909	Carbon 1,5 KΩ 5% 1/2W.
ZOCALO ⚠	0330163205	CRT Socket MINI NECK ONE Ground

MAIN PCB

Ref. No.		Part No.	Description
CF200	A2-C	0090411109	Ceramic Filter 5,5 MH.
CF200	A2-E	0090412701	Ceramic Trap Filter 5,5/6,5 MHZ
CF200	AS2-F	0090412701	Ceramic Trap Filter 5,5/6,5 MHZ
CF201	A2-E	0090412800	Ceramic Filter 6,5 MHZ.
CF202		0090412503	Ceramic Filter 5.5 MHz.
CN.FB		0160202305	Polarized Band Gray 2P. 280/6/6
CAPACITORS			
C108		0230170318	Ceramic SMD 27 pF. 5% 50V. 0805
C109		0230170318	Ceramic SMD 27 pF. 5% 50V. 0805
C110		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C111		0250320769	Electrolytic 10 µF. 16V.
C112		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C114		0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C115		0250461266	Electrolytic 100 µF. 16V.
C116		0230240327	Ceramic SMD 100 pF. 5% 50V. 0805
C117		0230160327	Ceramic SMD 22 pF. 1% 50V. 0805
C118		0230440125	Ceramic SMD 4700 pF. 10% 50V. 0805
C123		0230440125	Ceramic SMD 4700 pF. 10% 50V. 0805
C124		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C125		0230160327	Ceramic SMD 22 pF. 1% 50V. 0805
C126		0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C127		0230280307	Ceramic SMD 220 pF. 5% 50V. 0805
C128		0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C129		0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C200		0250320769	Electrolytic 10 µF. 16V.
C201		0230190308	Ceramic SMD 39 pF. 5% 50V. 0805
C202		0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C203	A2-E	0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C204		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C205		0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C206		0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C208	AS2-F	0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C209		0230220204	Ceramic SMD 68 pF. 5% 50V. 0805
C210	A2-E	0230220204	Ceramic SMD 68 pF. 5% 50V. 0805
C211	A2-E	0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C212	A2-C	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
C212	A2-E	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C212	AS2-F	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
C250		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C251		0250461266	Electrolytic 100 µF. 16V.
C252		0270370588	Polyester 180 nF. 10% 63V.
C256		0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C257		0270370588	Polyester 180 nF. 10% 63V.
C260		0250410867	Electrolytic 47 µF. 16V.
C302		0230720203	Ceramic SMD 1 µF. 16V. +80-20% 0805
C304	✶	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C305		0250410867	Electrolytic 47 µF. 16V.
C306		0250360468	Electrolytic 22 µF. 16V.
C310		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C323		0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C324		0250500667	Electrolytic 220 µF. 16V.
C325		0250141462	Electrolytic 470 µF. 16V. 8X11,5
C326		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C400		0250461266	Electrolytic 100 µF. 16V.
C401		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C402		0230680308	Ceramic SMD 470 nF. 10% 16V. 0805
C403		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C404	AS2-F	0230640401	Ceramic SMD 220 nF. 10% 16V.0805
C405		0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C406		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C408		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C409		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C410		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C411		0230150229	Ceramic SMD 18 pF. 1% 50V. 0805
C412		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C413		0230420119	Ceramic SMD 3300 pF.10% 63V.0805
C414		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C415		0250461266	Electrolytic 100 µF. 16V.
C416		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C417		0230400103	Ceramic SMD 2200 pF. 10% 50V. 0805
C418		0230420119	Ceramic SMD 3300 pF.10% 63V.0805
C419		0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C420		0230720203	Ceramic SMD 1 µF. 16V. +80-20% 0805
C421		0230440125	Ceramic SMD 4700 pF. 10% 50V. 0805
C422		0230180226	Ceramic SMD 33 pF. 1% 50V. 0805

Ref. No.		Part No.	Description
C423		0240136010	Ceramic 1000 pF. 10% 100V.
C424		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C425		0270342603	Policarbonate 100 nF. 5% 63V.
C426		0250320769	Electrolytic 10 µF. 16V.
C427		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C428		0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C429		0240136010	Ceramic 1000 pF. 10% 100V.
C430		0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C431		0230440125	Ceramic SMD 4700 pF. 10% 50V. 0805
C433		0230240327	Ceramic SMD 100 pF. 5% 50V. 0805
C434		0250320769	Electrolytic 10 µF. 16V.
C435		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C438	✶	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C440	✶	0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C441	✶	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C600		0270220726	Polyester 10 nF. 10% 250V.
C601		0270301039	Polyester 47 nF. 5% 63V.
C603		0270381080	Polyester 220 nF. 10% 63V.
C611		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C651		0260210604	Polypropylene 8200 pF 3,5% 1600V
C653		0270410004	Polyester 390 nF. 5% 250V.
C655		0270100522	Polyester 1000 pF. 10% 400V.
C656		0270290802	Polyester 39 nF. 5% 400V.
C657		0270210628	Polyester 8200 pF. 10% 250V.
C668		0250323201	Electrolytic 10µF 160V
C670	✶	0230240327	Ceramic SMD 100 pF. 5% 50V. 0805
C674		0230520405	Ceramic SMD 22 nF. 10% 50V. 0805
C675		0230600504	Ceramic SMD 100 nF. 10% 25V. 0805
C676		0230680308	Ceramic SMD 470 nF. 10% 16V. 0805
C678		0230680308	Ceramic SMD 470 nF. 10% 16V. 0805
C700		0250461464	Electrolytic 100 µF. 35V.
C701		0250461464	Electrolytic 100 µF. 35V.
C702		0250461464	Electrolytic 100 µF. 35V.
C703		0270381080	Polyester 220 nF. 10% 63V.
C711	✶	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C713	✶	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C714	✶	0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C800	✶⚠	0270342702	Polyester 100 nF. 20% 275V.AC
C801		0240134767	Ceramic 1000 pF. +-20% 1KV.
C802		0240134767	Ceramic 1000 pF. +-20% 1KV.
C803		0250464369	Electrolytic. 100 µF. 385V. 22X35
C804	✶⚠	0240136135	Ceramic 1000 pF. 20% 4KV
C806		0250210861	Electrolytic 0,47 µF. 50V.
C807		0270140338	Polyester 2200 pF. 10% 63V.
C809		0230300204	Ceramic SMD 330 pF. 10% 50V. 0805
C810		0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C811		0250412962	Electrolytic 47 µF. 50V.
C812		0230240327	Ceramic SMD 100 pF. 5% 50V. 0805
C813		0270100431	Polyester 1000 pF. 10% 63V.
C850		0250465002	Electrolytic. 100µF. 160V. 16X25
C851		0250572468	Electrolytic 1000 µF. 16V.
C852		0240470708	Ceramic 220 pF. 5% 1KV. PULSE SL
C853		0270140338	Polyester 2200 pF. 10% 63V.
C854		0230360406	Ceramic SMD 1000 pF. 10% 50V. 0805
C856		0230600603	Ceramic SMD 100 nF. +80-20% 25V.
C857		0250320769	Electrolytic 10 µF. 16V.
C858		0250461266	Electrolytic 100 µF. 16V.
C859		0230640401	Ceramic SMD 220 nF. 10% 16V. 0805
C860		0230480600	Ceramic SMD 10 nF. +80-20% 50V 0805
C900		0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C901	✶	0230240327	Ceramic SMD 100 pF. 5% 50V. 0805
C902		0250320769	Electrolytic 10 µF. 16V.
C903		0250410867	Electrolytic 47 µF. 16V.
C904		0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C905		0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C906		0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C909	✶	0230320301	Ceramic SMD 470 pF. 10% 50V. 0805
C910		0250414307	Electrolytic N.P. 47 µF 20% 10V
C911		0250414307	Electrolytic N.P. 47 µF 20% 10V
C912		0250414307	Electrolytic N.P. 47 µF 20% 10V
C1400	AS2-F	0230360406	Ceramic SMD 1000 PF.10% 50V.
C1401	AS2-F	0230600603	Ceramic SMD 100 NF.+80-20% 25V.
C1402	AS2-F	0250320769	Electrolytic 10 µF. 16V.
C1403	AS2-F	0230480600	Ceramic SMD 10 NF. +80-20% 50V.
C1404	AS2-F	0250280864	Electrolytic 4,7 µF. 25V.
C1405	AS2-F	0250280864	Electrolytic 4,7 µF. 25V.
C1406	AS2-F	0230600603	Ceramic SMD 100 nF.+80-20% 25V.
C1407	AS2-F	0230360406	Ceramic SMD 1000 pF.10% 50V.
C1408	AS2-F	0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C1409	AS2-F	0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C1410	AS2-F	0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C1411	AS2-F	0230360406	Ceramic SMD 1000 pF.10% 50V.
C1412	AS2-F	0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%
C1413	AS2-F	0230740003	Ceramic SMD 2,2 µF. 10V. +80-20%

DIODES

D100		0360126304	Red 3mm.
D102		0360130819	1N 4148
D103		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
D104		0360130819	1N 4148
D105		0360130819	1N 4148
D106		0360130819	1N 4148
D107		0360111009	BAT 42 DO 35
D108		0360111009	BAT 42 DO 35
D109		0360111009	BAT 42 DO 35
D200	A2-C	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
D200	AS2-F	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
D200	A2-E	0360601512	SMD LS4148
D201	A2-E	0360601512	SMD LS4148
D250		0360706014	HZT33-02 RE
D251	AS2-F	0360601512	SMD LS4148
D302		0360601512	SMD LS4148
D303		0360601512	SMD LS4148
D400		0360601512	SMD LS4148
D600		0360601512	SMD LS4148
D601		0360601512	SMD LS4148
D606		0360601512	SMD LS4148
D607		0360601512	SMD LS4148
D611		0360601512	SMD LS4148
D651		0360601512	SMD LS4148
D652		0360601512	SMD LS4148
D661		0360377006	ERB44-04
D662		0360378400	ERB06-13
D663		0360377006	ERB44-04
D674		0360602411	Zener SMD BZT55C6V2
D675		0360601512	SMD LS4148
D680		0360377006	ERB44-04
D681		0360377006	ERB44-04
D685		0360601512	SMD LS4148
D700		0360601512	SMD LS4148
D701		0360130629	1N 4007 RL
D703		0360005409	Zener BZX79C24
D800		0360130629	1N 4007 RL
D801		0360130629	1N 4007 RL
D802		0360130629	1N 4007 RL
D803		0360130629	1N 4007 RL
D804		0360601512	SMD LS4148
D806		0360376909	ERB44-02
D850		0360376404	ERB44-06
D851		0360377303	Schottky ERB84-009 90V 2A
D852		0360601512	SMD LS4148
D901		0360602213	Zener SMD BZT55C5V1
D902		0360602213	Zener SMD BZT55C5V1
D904		0360602213	Zener SMD BZT55C5V1
D905		0360602213	Zener SMD BZT55C5V1
D906		0360602213	Zener SMD BZT55C5V1
D907		0360602213	Zener SMD BZT55C5V1
D908		0360602213	Zener SMD BZT55C5V1
D1200	AS2-F	0360601512	SMD LS4148
D1201	AS2-F	0360601512	SMD LS4148

FUSES

F-800		0760100701	Fuse Terminal Taped
F800	⚠	0330110503	Fuse T 2 A./250V. TIME-LAG

CONNECTORS

FB	0330144007	Ribbon Wire Holder 2 P.
FC	0330270307	2P. Socket
FE	0330115106	2P. Socket X RTM 1/6/8
FF	0330129701	4 P. Socket
FG	0330144205	Ribbon Wire Holder 4 P.
FI	0330163304	Ribbon Wire Holder 8 P.

INTEGRATED CIRCUITS

IC100A	0360516702	ST92185B1B1

Ref. No.		Part No.	Description
IC125		0360711501	M24C04-MN6T
IC300		0360512305	TDA 7233 S
IC400	A2-C	0360514509	TDA 8841 N2
IC400	A2-E	0360514509	TDA 8841 N2
IC400	AS2-F	0360515001	TDA 8842 N2
IC701		0360516207	LA7840L
IC800		0360467203	MC44603P
IC850		0360472906	KA7805TU
IC1400	AS2-F	0360514806	SMD TDA9830T V1
IC1401	AS2-F	0360148209	SMD HEF 4052BT
JO400	A2-C	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JO400	A2-E	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JO401	A2-C	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JO401	A2-E	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JO652		0470040007	Jumper Lead 0,6 mm.
J139		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J148		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J149		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J224	AS2-F	0470040007	Puente
J235	AS2-F	0470040007	Puente
J241	AS2-F	0470040007	Puente
J242	AS2-F	0470040007	Puente
J243	AS2-F	0470040007	Puente
J246	AS2-F	0470040007	Puente
J251	AS2-F	0470040007	Puente
J297	AS2-F	0470040007	Puente
J300	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
J306	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
J343	AS2-F	0470040007	Puente
J301	A2-C	0470040007	Jumper Lead 0,6 mm.
J301	AS2-F	0470040007	Jumper Lead 0,6 mm.
J342		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J383		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J385		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J389		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J392		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J400		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J503		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JC0	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
JC4	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
JC5	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
JC6	A2-E	0790701106	R.M.G. SMD 0 OHM 1/10W.
JC8	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
JO1151	AS2-F	0790701106	R.M.G. SMD 0 OHM 1/10W.
COILS			
L100		0470040007	Jumper Lead 0,6 mm.
L101		0470040007	Jumper Lead 0,6 mm.
L102		0090317223	Peaking Coil 100 µH. 10%
L103		0090305525	Choke R.F. 33 µH. 10%
L201	A2-C	0090319328	Peaking Coil 15 µH. 10%
L201	A2-E	0090315029	Choque R.F. 10 µH. 10%
L201	AS2-F	0090315029	Choque R.F. 10 µH. 10%
L250	A2-C	0090319229	Peaking Coil 4,7 µH. 10%
L251	A2-C	0090316845	Peaking Coil 1µH 10% RADIAL
L251	AS2-F	0090317140	Choque R.F. 0,39 µH. 20% Radial
L252	AS2-F	0090316845	Choque R.F. 1µH 10% Radial
L300	⚠	0790528814	Fuse 2,2 Ω 5% 0,33W.
L301		0470040007	Jumper Lead 0,6 mm.
L304		0090305327	Peaking Coil 10 µH. 10%
L400		0090319229	Peaking Coil 4,7 µH. 10%
L401		0090319229	Peaking Coil 4,7 µH. 10%
L402		0090319229	Peaking Coil 4,7 µH. 10%
L403		0090319229	Peaking Coil 4,7 µH. 10%
L404		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
L405		0090319229	Peaking Coil 4,7 µH. 10%
L600		0470040007	Jumper Lead 0,6 mm.
L666		0470040007	Jumper Lead 0,6 mm.
L701		0470040007	Jumper Lead 0,6 mm.
L702		0470040007	Jumper Lead 0,6 mm.
L800	✶⚠	0090413709	Mains Filter 2X19 MH. 250 VAC. 0,5A
L801		0090318668	Peaking Coil 1 µH. 20% I MAX=270MA
L802		0470040007	Jumper Lead 0,6 mm.
L850		0620005504	Ferritebead 3,5X6 80 Ω/100 MHz
L851		0620005504	Ferritebead 3,5X6 80 Ω/100 MHz
L853		0620005504	Ferritebead 3,5X6 80 Ω/100 MHz

Ref. No.		Part No.	Description
L900		0620011502	Ferrite SMD 0603 600 Ω/20 MHz
L901	✶	0090315029	Peaking Coil 10 µH. 10%
L902	✶	0090316845	Peaking Coil 1µH 10% RADIAL
L903	✶	0090318668	Peaking Coil 1 µH. 20% I MAX=270MA
L1401	AS2-F	0090319229	Choque R.F. 4,7 µH. 10%
PCB11	⚠	0750152514	MAIN PCB EC7-A
BUTTON			
PL100		0130214703	PUSH Switch Insertable 160GR.
PL101		0130214703	PUSH Switch Insertable 160GR.
PL102		0130214703	PUSH Switch Insertable 160GR.
PL103		0130214703	PUSH Switch Insertable 160GR.
PTC800	⚠	0810101907	P.T.C. 18 Ω
TRANSISTORS			
Q101		0360308803	SMD PMBT2369
Q102		0360320501	BRT SMD PDTA124ET
Q104		0360321301	SMD BC 857 B
Q200		0360320303	SMD BC 847 B
Q201		0360321301	SMD BC 857 B
Q250	AS2-F	0360320303	SMD BC 847 B
Q251		0360308803	SMD PMBT2369
Q252		0360320501	BRT SMD PDTA124ET
Q253		0360320501	BRT SMD PDTA124ET
Q254		0360320501	BRT SMD PDTA124ET
Q401		0360321301	SMD BC 857 B
Q402		0360320303	SMD BC 847 B
Q600		0360308704	KSP 44 TO-92
Q601		0360321301	SMD BC 857 B
Q611		0360320600	BRT SMD PDTC124ET
Q650		0360308902	2SD2599
Q651		0360320303	SMD BC 847 B
Q673		0360320303	SMD BC 847 B
Q800		0360311005	MOS 2SK3067 600V/2A
Q850		0360320303	SMD BC 847 B
Q851		0360308605	KSP 92 TO-92
Q852		0360308506	KSP 42 TO-92
Q853		0360306104	2SB 764 E
Q853	AS2-F	0360173504	TIP 32 C
Q854		0360320303	SMD BC 847 B
Q855		0360320303	SMD BC 847 B
Q856		0360169718	BC 639
Q857		0360321301	SMD BC 857 B
Q858		0360321301	SMD BC 857 B
Q859		0360321301	SMD BC 857 B
Q860		0360321301	SMD BC 857 B
Q900		0360320303	SMD BC 847 B
Q1200	AS2-F	0360320303	SMD BC 847 B
Q1201	AS2-F	0360320303	SMD BC 847 B
Q1400	AS2-F	0360320410	SMD BF 570
Q1401	AS2-F	0360320600	BRT SMD PDTC124ET
Q1404	AS2-F	0360320303	SMD BC 847 B
RI100		0600123004	Infrared Receiver TSOP1838
RESISTORS			
R100		0790242002	R.M.G. SMD 1,8 KΩ 5% 1/10W. 0805
R101		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R102		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R104		0790245005	R.M.G. SMD 3,3 KΩ T<=5% 0805
R105		0790752208	R.M.G. SMD 12 KΩ T<=5% 0805
R106		0790753909	R.M.G. SMD 15 KΩ T<=5% 0805
R108		0790138804	Carbon 1 KΩ 5% 1/6W.
R110		0790248009	R.M.G. SMD 5,6 KΩ T<=5% 0805
R111		0790235006	R.M.G. SMD 470 Ω T<=5% 0805
R112		0790126700	Carbon 100 Ω 5% 1/6W.
R113		0790159503	Carbon 47 KΩ 5% 1/6W
R115		0790251409	R.M.G. SMD 12 KΩ 1% 1/10W.
R116		0790255103	R.M.G. SMD 22 KΩ 1% 1/10W.
R117		0790368922	Metal Film 4,70 KΩ 1% 0,4W.
R118		0790126700	Carbon 100 Ω 5% 1/6W.
R119		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R120		0790248108	R.M.G. SMD 5,6 KΩ 1% 1/10W.
R121		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R123		0790248009	R.M.G. SMD 5,6 KΩ T<=5% 0805

Ref. No.		Part No.	Description
R124		0790243000	R.M.G. SMD 2,2 KΩ T<=5% 0805
R126	AS2-F	0790239008	R.M.G. SMD 1 KOHM T<=5%
R128	AS2-F	0790239008	R.M.G. SMD 1 KOHM T<=5%
R134		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R135		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R136		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R137		0790138804	Carbon 1 KΩ 5% 1/6W.
R141		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R1416		0790256002	R.M.G. SMD 27 KΩ T<=5% 0805
R142		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R143		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R144		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R145	A2-E	0790239008	R.M.G. SMD 1 KOHM T<=5%
R146	A2-E	0790239008	R.M.G. SMD 1 KOHM T<=5%
R149		0790233001	R.M.G. SMD 330 Ω T<=5% 0805
R150		0790248009	R.M.G. SMD 5,6 KΩ T<=5% 0805
R151		0790248009	R.M.G. SMD 5,6 KΩ T<=5% 0805
R152		0790248009	R.M.G. SMD 5,6 KΩ T<=5% 0805
R154		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R155		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R156		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R157		0790246003	R.M.G. SMD 3,9 KΩ T<=5% 0805
R158		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R160		0790263008	R.M.G. SMD 100 KΩ T<=5% 0805
R161		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R162		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R163		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R165	AS2-F	0790227003	R.M.G. SMD 100 OHM T<=5%
R167		0790138804	Carbon 1 KΩ 5% 1/6W.
R172		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R175		0790126700	Carbon 100 Ω 5% 1/6W.
R200		0790138804	Carbon 1 KΩ 5% 1/6W.
R201		0790131106	Carbon 220 Ω 5% 1/4W.
R202		0790235006	R.M.G. SMD 470 Ω T<=5% 0805
R203		0790846109	R.M.G. SMD 220 Ω T<=5% 0805
R204		0790233001	R.M.G. SMD 330 Ω T<=5% 0805
R204	A2-E	0790846109	R.M.G. SMD 220 OHM T<=5%
R204	AS2-F	0790846109	R.M.G. SMD 220 OHM T<=5%
R205		0790749402	R.M.G. SMD 6,8 KΩ T<=5% 0805
R205	A2-E	0790247001	R.M.G. SMD 4,7 KOHM T<=5%
R205	AS2-F	0790247001	R.M.G. SMD 4,7 KOHM T<=5%
R206		0790846109	R.M.G. SMD 220 Ω T<=5% 0805
R207		0790223002	R.M.G. SMD 47 Ω T<=5% 0805
R208		0790223002	R.M.G. SMD 47 Ω T<=5% 0805
R209		0790237002	R.M.G. SMD 680 Ω T<=5% 0805
R209	A2-E	0790242002	R.M.G. SMD 1,8 KΩ 5% 1/10W.
R210	A2-E	0790239008	R.M.G. SMD 1 KΩ 5% 1/10W.
R211	A2-E	0790144505	R.M.G. SMD 2,7 KΩ 5% 1/6W.
R212		0790234009	R.M.G. SMD 390 Ω T<=5% 0805
R213	A2-E	0790144505	R.M.G. SMD 2,7 KΩ 5% 1/6W.
R215	✶	0790131908	Carbon 220 Ω 5% 1/6W.
R250	AS2-F	0790151500	Carbón 10 KOHM 5% 1/6W.
R252		0790235006	R.M.G. SMD 470 Ω T<=5% 0805
R253		0790263008	R.M.G. SMD 100 KΩ T<=5% 0805
R254		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R255		0790252001	Metal GL. RES. 15 KΩ 1% 1/10W.
R256		0790753909	R.M.G. SMD 15 KΩ T<=5% 0805
R257		0790577142	Metal Oxide 12 KΩ 5% 2W.
R258		0790259006	R.M.G. SMD 47 KΩ T<=5% 0805
R259		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
R261		0790753909	R.M.G. SMD 15 KΩ T<=5% 0805
R262		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
R262	AS2-F	0790251003	R.M.G. SMD 10 KOHM T<=5%
R263		0790246003	R.M.G. SMD 3,9 KΩ T<=5% 0805
R264	AS2-F	0790145106	Carbón 3,3 KOHM 5% 1/6W.
R265	AS2-F	0790247001	R.M.G. SMD 4,7 KOHM T<=5%
R302		0790757603	R.M.G. SMD 33 KΩ T<=5% 0805
R303		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R304		0790275002	R.M.G. SMD 1 MΩ T<=5% 0805
R305		0790128409	Carbon 120 Ω 5% 1/2W.
R316		0790248009	R.M.G. SMD 5,6 KΩ T<=5% 0805
R317		0790111207	Carbon 4,7 Ω 5% 1/4W.
R319		0790160501	Carbon 56 KΩ 5% 1/6W.
R400		0790126700	Carbon 100 Ω 5% 1/6W.
R401		0790126700	Carbon 100 Ω 5% 1/6W.

Ref. No.		Part No.	Description
R402		0790151500	Carbon 10 KΩ 5% 1/6W.
R403		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R404		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R405		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R406		0790234702	R.M.G. SMD 430 Ω T<=5% 0805
R407	✶	0790138804	Carbon 1 KΩ 5% 1/6W.
R408	✶	0790138804	Carbon 1 KΩ 5% 1/6W.
R412		0790263008	R.M.G. SMD 100 KΩ T<=5% 0805
R413		0790126700	Carbon 100 Ω 5% 1/6W.
R414		0790756308	Carbon 27 KΩ 5% 1/6W.
R416		0790288005	R.M.G. SMD 10 MΩ 5% 1/10W. 0805
R418		0790753909	R.M.G. SMD 15 KΩ T<=5% 0805
R419		0790753909	R.M.G. SMD 15 KΩ T<=5% 0805
R420		0790133102	Carbon 330 Ω 5% 1/4W.
R421		0790232003	R.M.G. SMD 270 Ω T<=5% 0805
R422		0790235006	R.M.G. SMD 470 Ω T<=5% 0805
R423		0790263008	R.M.G. SMD 100 KΩ T<=5% 0805
R424		0790256002	R.M.G. SMD 27 KΩ T<=5% 0805
R425		0790268007	R.M.G. SMD 330 KΩ T<=5% 0805
R426		0790758304	R.M.G. SMD 39 KΩ 1% 1/8W. 0805
R427		0790137707	Carbon 680 Ω 5% 1/6W
R428		0790237002	R.M.G. SMD 680 Ω T<=5% 0805
R430		0790135701	Carbon 470 Ω 5% 1/6W.
R431		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R433		0790126700	Carbon 100 Ω 5% 1/6W.
R434		0790126700	Carbon 100 Ω 5% 1/6W.
R435		0790126700	Carbon 100 Ω 5% 1/6W.
R436		0790126700	Carbon 100 Ω 5% 1/6W.
R437		0790126700	Carbon 100 Ω 5% 1/6W.
R600		0790329015	Metal Film 82 Ω 5% 2W
R601		0790142905	Carbon 2 KΩ 5% 1/4W.
R604		0790131601	Carbon 220 Ω 5% 1/2W.
R606		0790539001	Metal Film 18 Ω 5% 1W.
R608		0790512313	Metal Film 0,33 Ω 5% 1W.
R611		0790600001	Metal Film 1 MΩ 1% 0,6W.
R612		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R653		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R655		0790594006	Metal Film 270KΩ 5% 2W.
R670		0470040007	Jumper Lead 0,6 mm.
R676		0790749402	R.M.G. SMD 6,8 KΩ T<=5% 0805
R682		0790259006	R.M.G. SMD 47 KΩ T<=5% 0805
R683		0790259006	R.M.G. SMD 47 KΩ T<=5% 0805
R684		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R685		0790363105	R.M.G. SMD 18 KΩ T<=5% 0805
R686		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R688		0790767503	R.M.G. SMD 220 KΩ T<=5% 0805
R691		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R702		0790526701	Metal Film 1,5 Ω 1% 0,6W.
R703		0790526701	Metal Film 1,5 Ω 1% 0,6W.
R705		0790136402	Carbon 560 Ω 5% 1/2W.
R706		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R708		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R711		0790343529	Metal Film 1,18 KΩ 1% 0,4W.
R712		0790343529	Metal Film 1,18 KΩ 1% 0,4W.
R800		0790180111	Carbon 2,2 MΩ 5% 1/2W.
R801		0790184113	Carbon 4,7 MΩ 5% 1/2W.
R802		0780147906	Wirewound 3,9 Ω 10% 5W.
R805		0790590111	Metal Film 150 KΩ 5% 2W.
R806		0790330518	Metal Film 100 Ω 5% 2W.
R807		0790161202	R.M.G. SMD 73,2 KΩ 1% 1/8W 0805
R808		0790252001	R.M.G. SMD 15 KΩ 1% 1/10W.
R811		0790275002	R.M.G. SMD 1 MΩ T<=5% 0805
R812		0790245005	R.M.G. SMD 3,3 KΩ T<=5% 0805
R813		0790764005	R.M.G. SMD 120 KΩ T<=5% 0805
R814		0790888101	R.M.G. SMD 9,1 KΩ T<=5% 0805
R815		0790154405	Carbon 18 KΩ 5% 1/6W.
R816		0790027502	Carbon 1 KΩ 5% 1/4W.
R817		0790131106	Carbon 220 Ω 5% 1/4W.
R818		0790027502	Carbon 1 KΩ 5% 1/4W.
R819		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R820		0790526818	Metal Film 1,5 Ω 5% 2W.
R821		0790526818	Metal Film 1,5 Ω 5% 2W.
R822	⚠	0790513014	Fuse 0,33 Ω 5% 0,5W.
R850		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R851		0790127104	Carbon 100 Ω 5% 1/4W.

Ref. No.		Part No.	Description
R852		0790774103	Carbon 820 KΩ 5% 1/6W.
R853		0790767503	R.M.G. SMD 220 KΩ T<=5% 0805
R854		0790258008	R.M.G. SMD 39 KΩ T<=5% 0805
R855		0790767503	R.M.G. SMD 220 KΩ T<=5% 0805
R856		0790167100	Carbon 220 KΩ 5% 1/4W.
R857		0790167100	Carbon 220 KΩ 5% 1/4W.
R858		0790151500	Carbon 10 KΩ 5% 1/6W.
R859		0790135701	Carbon 470 Ω 5% 1/6W.
R860		0790118202	Carbon 18 Ω 5% 1/2W.
R861		0790135909	Carbon 560 Ω 5% 1/6W.
R862		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R863		0790343123	Metal Film 1,00 KΩ 1% 0,4W.
R864		0790347009	M.G.R. SMD 1,78 KΩ 1% 1/8W 0805
R865		0790735807	Carbon 510 Ω 5% 1/6W.
R866		0790242002	R.M.G. SMD 1,8 KΩ 5% 1/10W. 0805
R867		0790259006	R.M.G. SMD 47 KΩ T<=5% 0805
R868		0790151500	Carbon 10 KΩ 5% 1/6W.
R869		0790771208	Carbon 470 KΩ 5% 1/6W.
R870		0790247001	R.M.G. SMD 4,7 KΩ T<=5% 0805
R910		0790046403	Carbon 12 KΩ 5% 1/4W.
R911		0790888101	R.M.G. SMD 9,1 KΩ T<=5% 0805
R912		0790026207	Carbon 560 Ω 5% 1/4W.
R913		0790227003	R.M.G. SMD 100 Ω T<=5% 0805
R914		0790129803	Carbon 150 Ω 5% 1/6W.
R915		0790239008	R.M.G. SMD 1 KΩ T<=5% 0805
R916		0790036305	Carbon 2,2 KΩ 5% 1/4W.
R917		0790036305	Carbon 2,2 KΩ 5% 1/4W.
R918		0790229009	R.M.G. SMD 150 Ω T<=5% 0805
R921		0790027502	Carbon 1 KΩ 5% 1/4W.
R922		0790225502	R.M.G. SMD 75 Ω T<=5% 0805
R923		0790225502	R.M.G. SMD 75 Ω T<=5% 0805
R924		0790225502	R.M.G. SMD 75 Ω T<=5% 0805
R925		0790225502	R.M.G. SMD 75 Ω T<=5% 0805
R926		0790225502	R.M.G. SMD 75 Ω T<=5% 0805
R927		0790229009	R.M.G. SMD 150 Ω T<=5% 0805
R928		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R929		0790251003	R.M.G. SMD 10 KΩ T<=5% 0805
R930		0790243000	R.M.G. SMD 2,2 KΩ T<=5% 0805
R931		0790151500	Carbon 10 KΩ 5% 1/6W.
R934		0790235006	R.M.G. SMD 470 Ω T<=5% 0805
R935		0790551113	Metal Film 180 Ω 5% 1W.
R941		0790236004	R.M.G. SMD 560 Ω 5% 1/10W. 0805
R942		0790237002	R.M.G. SMD 680 Ω T<=5% 0805
R944		0790236004	R.M.G. SMD 560 Ω 5% 1/10W. 0805
R945		0790237002	R.M.G. SMD 680 Ω T<=5% 0805
R947		0790236004	R.M.G. SMD 560 Ω 5% 1/10W. 0805
R948		0790237002	R.M.G. SMD 680 Ω T<=5% 0805
R952		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
R953		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
R954		0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
R1200	AS2-F	0790251003	R.M.G. SMD 10 KOHM T<=5%
R1201	AS2-F	0790243000	R.M.G. SMD 2,2 KOHM T<=5%
R1202	AS2-F	0790245005	R.M.G. SMD 3,3 KOHM T<=5%
R1203	AS2-F	0790251003	R.M.G. SMD 10 KOHM T<=5%
R1204	AS2-F	0790245005	R.M.G. SMD 3,3 KOHM T<=5%
R1205	AS2-F	0790259006	R.M.G. SMD 47 KOHM T<=5%
R1206	AS2-F	0790245005	R.M.G. SMD 3,3 KOHM T<=5%
R1401	AS2-F	0790229009	R.M.G. SMD 150 OHM T<=5%
R1402	AS2-F	0790243000	R.M.G. SMD 2,2 KOHM T<=5%
R1403	AS2-F	0790741805	R.M.G. SMD 1,5 KOHM T<=5%
R1404	AS2-F	0790846109	R.M.G. SMD 220 OHM T<=5%
R1406	AS2-F	0790243000	R.M.G. SMD 2,2 KOHM T<=5%
R1411	AS2-F	0790247001	R.M.G. SMD 4,7 KOHM T<=5%
R1412	AS2-F	0790245005	R.M.G. SMD 3,3 KOHM T<=5%
R1415	AS2-F	0790259006	R.M.G. SMD 47 KOHM T<=5%
R1417	AS2-F	0790259006	R.M.G. SMD 47 KOHM T<=5%
R1418	AS2-F	0790256002	R.M.G. SMD 27 KOHM T<=5%
R1419	AS2-F	0790239008	R.M.G. SMD 1 KOHM T<=5%
R928	AS2-F	0790749402	R.M.G. SMD 6,8 KOHM T<=5%
R929	AS2-F	0790749402	R.M.G. SMD 6,8 KOHM T<=5%
R931	AS2-F	0790149405	Carbón 6,8 KOHM 5% 1/6W.
SF200	✶ A2-C	0090411208	SAW Filter G1968M
SF200	✶ A2-E	0090403510	SAW Filter K2950M
SF200	✶ AS2-F	0090413402	Filtro Onda Superficial K2962M
SF250	AS2-F	0090413600	Filtro Cerámico MKT40.4MA110P
SF1400	AS2-F	0090413501	Filtro Onda Superficial L9453M
SW800	⚠	0140204108	Power Switch S-95 WITHOUT WIPER
S300		0330143009	Headphone Jack EK1052
S900		0330161415	Scart Connector 21 PIN BLACK
S901		0330133109	VIDEO RCA Connector EK105Y
S902		0330133208	AUDIO RCA Connector EK105W
TUNER			
TU250	✶	0850102617	Tuner UV1315/AI-2
TU250	✶ AS2-F	0850103201	Tuner UV1315/S I-2
TRANSFORMERS			
T600		0940200702	Driver Transformer 360T/40T
T650	⚠	0940109200	Split Transformer 14" 10678360
T800	✶⚠	0930107511	Switch MODE Transformer EC7A 10679390
VR800		0770511368	VR 2,2 KΩ
X100		0090122300	Quartz Crystal 8MHz
X400		0090121104	Quartz Crystal, 4,4336190 MHz.

ELECTRICAL ASSY

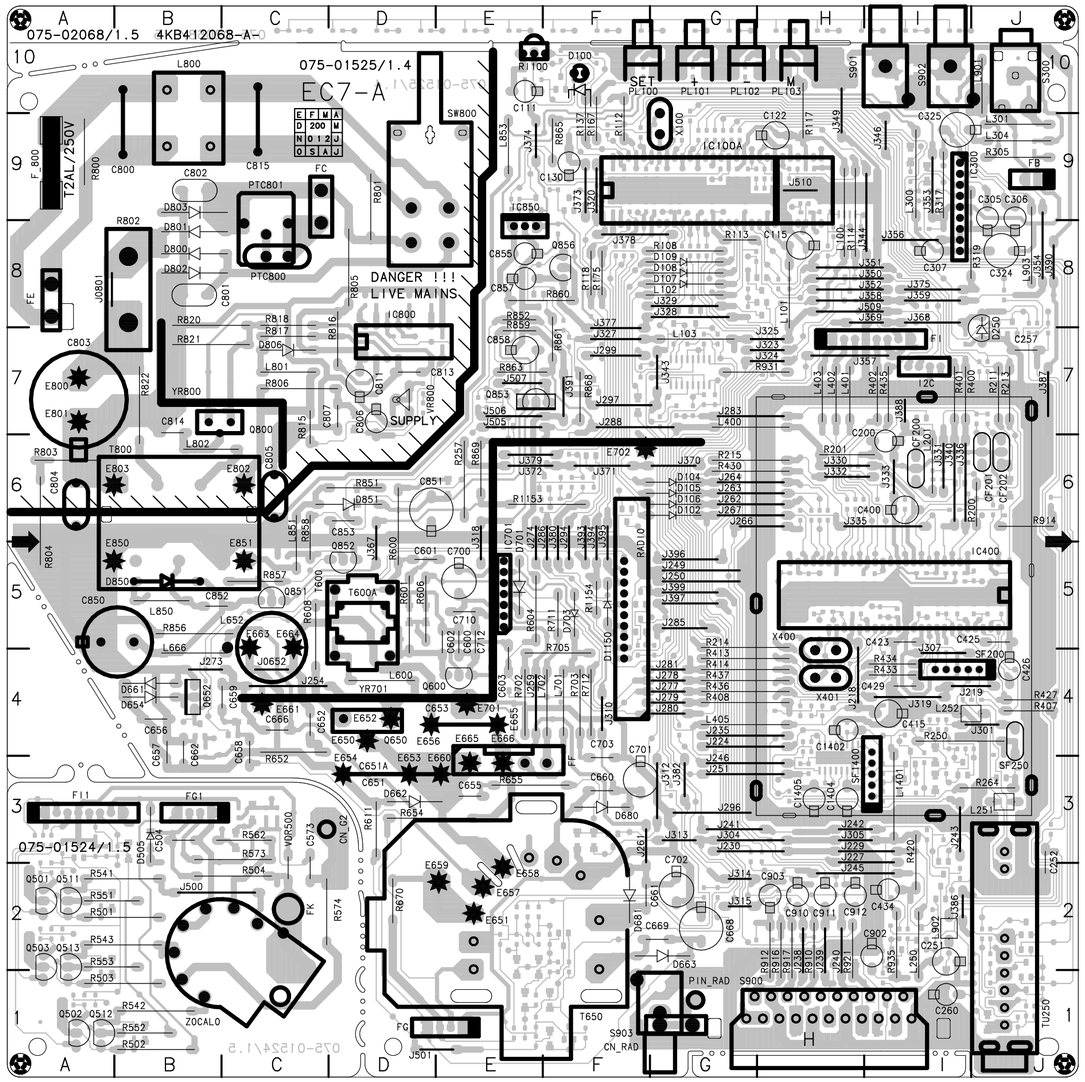
BRDEFL		0010203503	Wire Band 98/2.5 Natural
BRDY		0200099406	Wire HOLDING HOOK G
BRFG		0010203503	Wire Band 98/2.5 Natural
BRRED		0010203503	Wire Band 98/2.5 Natural
CN.FE	⚠	0330208216	Power Cord Assy 17-212 L=2000 MM
CN.FF		0330211822	4P Connector W/LEADS 330+25 MM DESF
SC001		0170200406	Shield Mesh 2 mm.
SC1001		0010001311	Spring Ground CRT
SPK1		0030118202	Speaker 8 Ω 2W. 3"
TRC	⚠	1000102127	Picture Tube 14"

PACKING

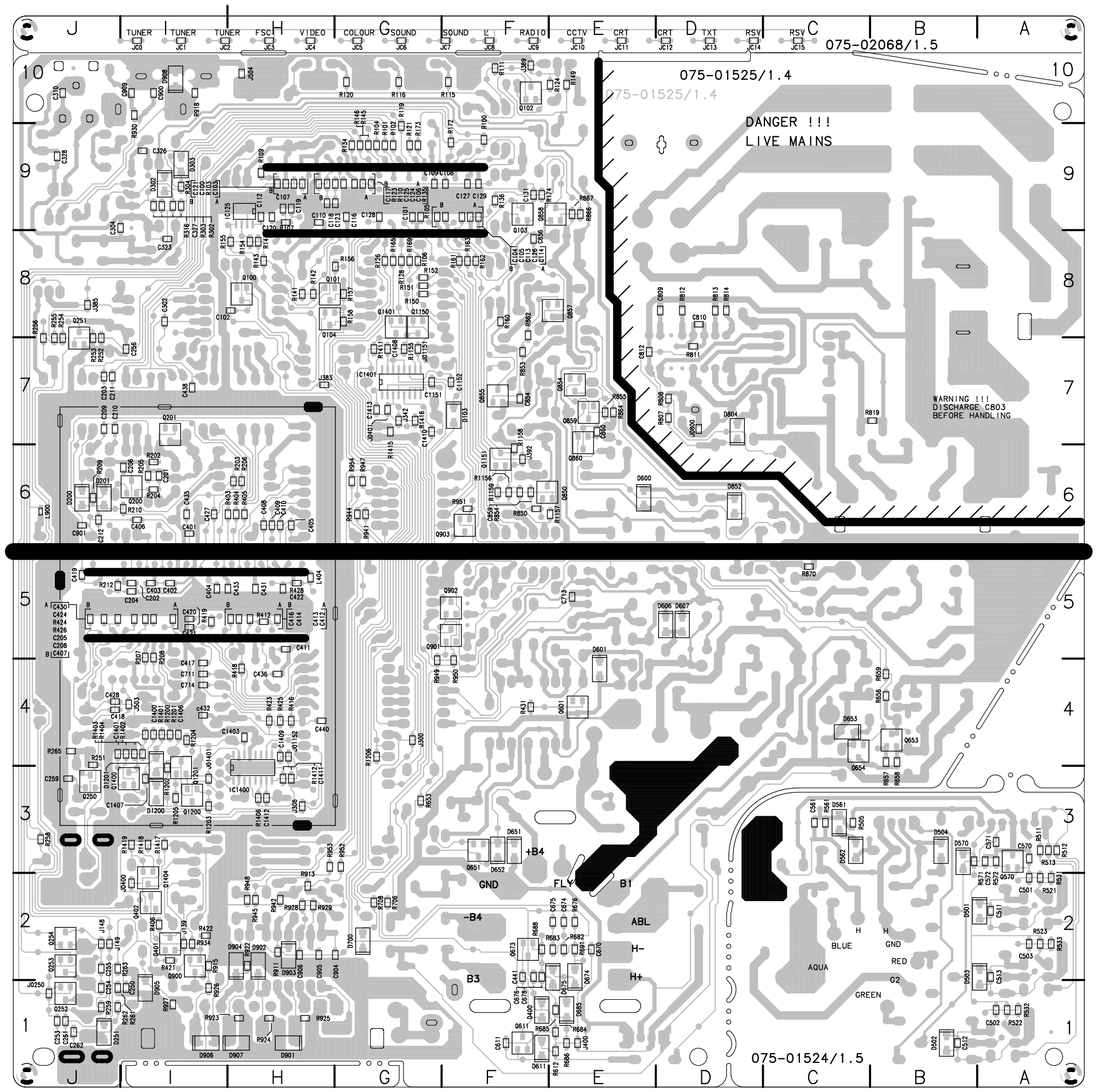
ANT		0330730417	Bipolar Telescopic Antenna W/BALUN
BAT		0660100603	Dry Battery 1,5V. SUM-3F
EM 1		0190203422	Packing Cartoon 14" EXP-C
EM 2		0190160606	Upper Cushion Assy 14" E8R8
EM 3		0190160705	Bottom Cushion Assy 14" E8R8
EM 7	⚠ A2-C	0420244006	Instruction Book 14" EC7-A
EM 7	⚠ A2-E	0420244105	Instruction Book 14" EC7-A
EM 7	⚠ AS2-F	0420244014	Instruction Book 14" EC7-A
EM10		0600123301	Remote Control EC7-A N/TXT SANYO

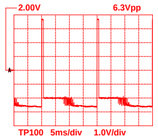
Note: All the information of this manual is correct in the beginning of the series; SANYO reserves the right to modify components and procedures to maintain its policy of continuous improvement.

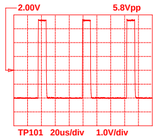
P.C.B. CARA COMPONENTES
P.C.B. COMPONENTS SIDE
P.C.B. LATO COMPONENTI

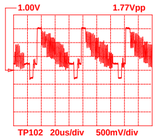


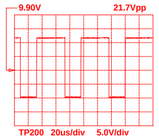
P.C.B. CARA SOLDADURAS
P.C.B. SOLDER SIDE
P.C.B. LATO SOLDATURE

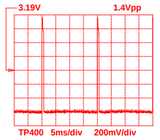


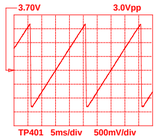


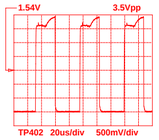


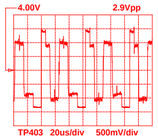


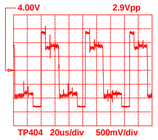


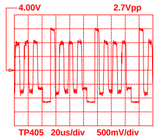


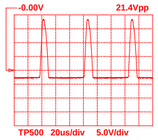


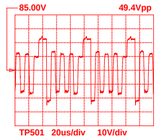


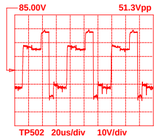


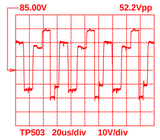


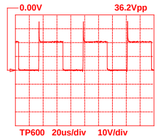


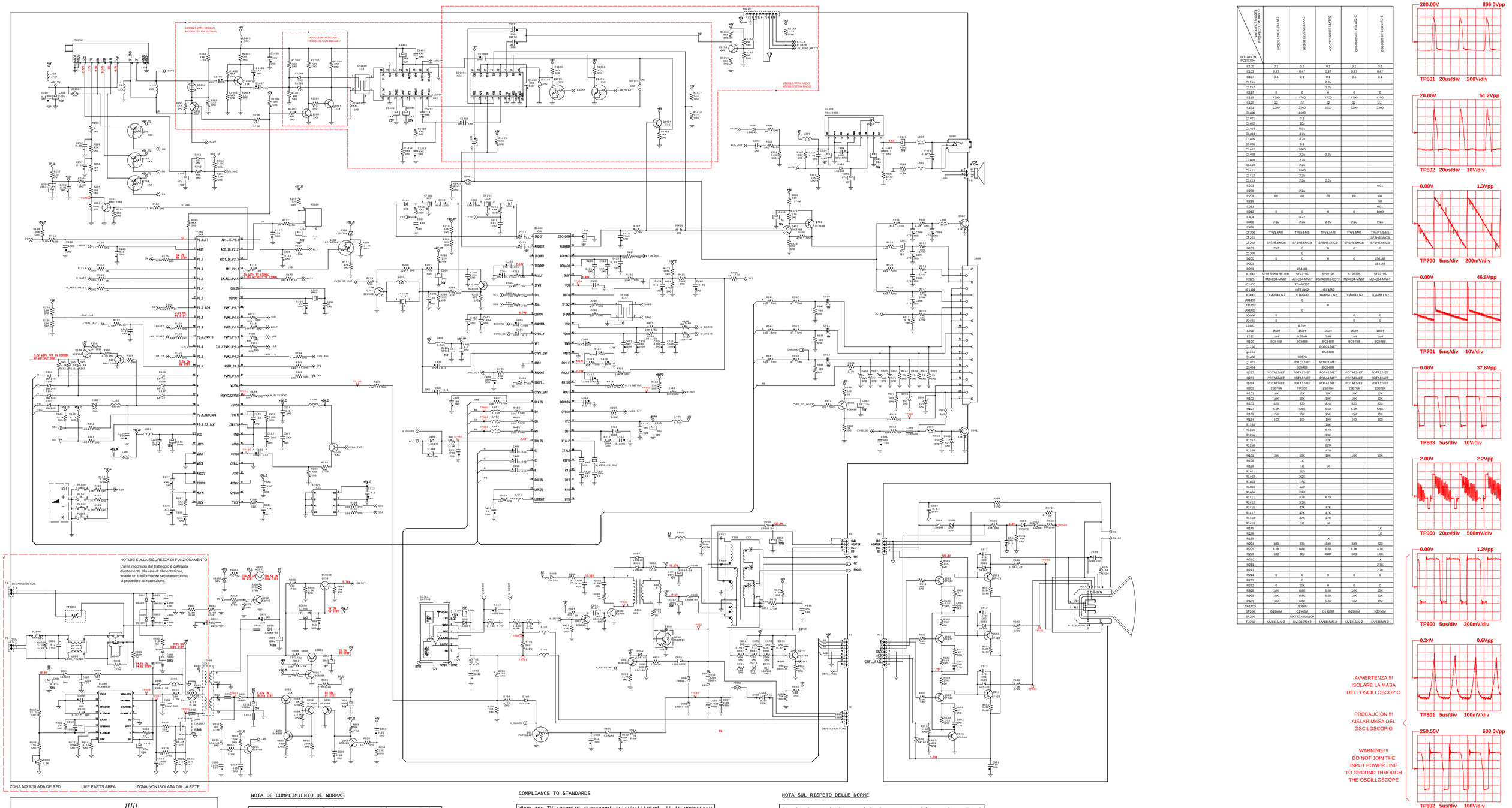












NOTIZIE SULLA SICUREZZA DI FUNZIONAMENTO

L'area racchiusa dal tratteggio è collegata direttamente alla rete di alimentazione, inserire un trasformatore separatore prima di procedere all'riparazione.

ZONA NO AISLADA DE RED | LIVE PARTS AREA | ZONA NON ISOLATA DALLA RETE

AVVERTENZA !!!
ISOLARE LA MASA
DELL'OSCILLOSCOPIO

PRECAUCIÓN !!!
AISLAR MASA DEL
OSCILOSCOPIO

WARNING !!!
DO NOT JOIN THE
INPUT POWER LINE
TO GROUND THROUGH
THE OSCILLOSCOPE

LOCATION / POSICION \ PRODUCT MODEL / PRODUCTO MODELO	000-157090 CE14AT2	000-157105 CE14AX2	000-157115 CE14ATR2	000-157950 CE14AT2-C	000-157945 CE14AT2-E
C100	0.1	0.1	0.1	0.1	0.1
C103	0.47	0.47	0.47	0.47	0.47
C107	0.1	0.1	0.1	0.1	0.1
C1151			2.2u		
C1152			2.2u		
C117	0	0	0	0	0
C119	4700	4700	4700	4700	4700
C120	22	22	22	22	22
C121	2200	2200	2200	2200	2200
C1400		1000			
C1401		0.1			
C1402		33u			
C1403		0.01			
C1404		4.7u			
C1405		4.7u			
C1406		0.1			
C1407		1000			
C1408		2.2u	2.2u		
C1409		2.2u			
C1410		2.2u			
C1411		1000			
C1412		2.2u			
C1413		2.2u	2.2u		
C203					0.01
C208		2.2u			
C209	68	68	68	68	68
C210					68
C211					0.01
C212	0	0	0	0	1000
C404		0.22			
C430	2.2u	2.2u	2.2u	2.2u	2.2u
C436		33u			
CF200	TPS5.5MB	TPS5.5MB	TPS5.5MB	TPS5.5MB	TRAP 5.5&5.5
CF201					SFSH6.5MCB
CF202	SFSH5.5MCB	SFSH5.5MCB	SFSH5.5MCB	SFSH5.5MCB	SFSH6.5MCB
D103	ZV7	0	0	0	0
D1200		0			
D200	0	0	0	0	LS4148
D201					LS4148
D251		LS4148			
IC100	ST92T195B78/EBL	ST92195	ST92195	ST92195	ST92195
IC125	M24C04-MN6T	M24C04-MN6T	M24C04-C6T	M24C04-C6T-C	M24C04-MN6T
IC1400		TDA8830T			
IC1401		HEF4052	HEF4052		
IC400	TDA8841 N2	TDA8442	TDA8841 N2	TDA8841 N2	TDA8841 N2
JO1151					
JO1152			0		
JO1401		0			
JO1400	0			0	0
JO1401	0			0	0
L1401		4.7uH			
L201	15uH	15uH	15uH	15uH	10uH
L251	1uH	0.39uH	1uH	1uH	1uH
Q100	BC848B	BC848B	BC848B	BC848B	BC848B
Q1150			PDTC124ET		
Q1151			BC848B		
Q1400		BF570			
Q1401		PDTC124ET	PDTC124ET		
Q1404		BC848B	BC848B		
Q252	PDTA124ET	PDTA124ET	PDTA124ET	PDTA124ET	PDTA124ET
Q253	PDTA124ET	PDTA124ET	PDTA124ET	PDTA124ET	PDTA124ET
Q254	PDTA124ET	PDTA124ET	PDTA124ET	PDTA124ET	PDTA124ET
Q853	2SB764	TIP32C	2SB764	2SB764	2SB764
R101	10K	10K	10K	10K	10K
R102	10K	10K	10K	10K	10K
R103	820	820	820	820	820
R107	5.6K	5.6K	5.6K	5.6K	5.6K
R109	15K	15K	15K	15K	15K
R114	100	100	100	100	100
R1154			10K		
R1155			4.7K		
R1156			10K		
R1157			22K		
R1158			820		
R1159			470		
R121	10K	10K	10K	10K	10K
R126		1K			
R128		1K	1K		
R1401		150			
R1402		2.2K			
R1403		1.5K			
R1404		220			
R1406		2.2K			
R1411		4.7K	4.7K		
R1412		3.3K			
R1415		47K	47K		
R1417		47K	47K		
R1418		27K	27K		
R1419		1K	1K		
R145					1K
R146					1K
R189			1K		
R204	330	330	330	330	220
R205	6.8K	6.8K	6.8K	6.8K	4.7K
R209	680	680	680	680	1.8K
R210					1K
R211					2.7K
R213					2.7K
R214	0	0	0	0	0
R251		0			
R262	0	10K	0	0	0
R928	10K	6.8K	6.8K	10K	10K
R929	10K	6.8K	6.8K	10K	10K
R931	10K	6.8K	6.8K	10K	10K
SF1400		L9266M			
SF200	G1966M	G1966M	G1966M	G1966M	K2950M
SF250		MKT40.4MA110P			
TU250	UV1315/A/-2	UV1315/6-I-2	UV1315/A/-2	UV1315/A/-2	UV1315/A/-2

FUSE RESISTOR | CERAMIC | POLYESTER | POLYPROPYLENE

SANYO

COLOUR TELEVISION 14" TXT

Models: CE14AT2 CE14AT2-E
CE14AX2
CE14ATR2
CE14AT2-C

Chassis: 2112 (Series EC7-A)

NOTA DE CUMPLIMIENTO DE NORMAS

Cuando se sustituye cualquier componente del receptor TV hay que consultar la lista de componentes del Manual de Servicio, y todos los componentes que estén indicados con * o ! deben ser sustituidos por recambios originales SANYO.

ATENCIÓN este televisor contiene elementos especialmente sensibles a la electricidad estática (ESD).
Recomendamos que se realice la manipulación de circuitos integrados y semiconductores con las debidas precauciones.

NOTAS:
1.- Los valores de las resistencias están expresados en Ohm K=1.000, M=1.000.000.
2.- Los valores de los condensadores menores de 1 están expresados en uF, los valores mayores de 1 están expresados en pF.
3.- Toda la información de este esquema es correcta en el inicio de la serie; SANYO se reserva el derecho de modificarlo para mantener su politica de mejora continua.
4.- Las medidas de tensiones y osciloramas se han efectuado con el TV sintonizado en el canal-21, ajustes normalizados e imagen con carta de barras de color.

COMPLIANCE TO STANDARDS

When any TV receptor component is substituted, it is necessary to check the list of components in the Service Manual and all of those marked with * or ! must be replaced with original spare SANYO parts.

WARNING! This TV set contains components that are particularly sensitive to static electricity (ESD).
It is recommended that all due precaution be taken handling integrated circuits and semiconductors.

NOTES:
1.- Resistor values are expressed in Ohm K=1000, M=1000000.
2.- Capacitor values lower than 1 are expressed in uF and values higher than 1 are expressed in pF.
3.- The information in this scheme is correct at the beginning of the series; SANYO reserves the right to modify this in accordance with on-going product improvement policy.
4.- The measurements of voltages and oscillograms were carried out with a TV set tuned to channel-21, normal adjustments and colour bar pattern.

NOTA SUL RISPETO DELLE NORME

Quando si sosttituisce qualsiasi componente del recevitore TV si deve consultare l'elenco dei componenti nel Manuale per la Manutenzione. Tutti i componenti contrassengati con * o ! devono essere sostituiti con ricambi originali SANYO.

ATTENZIONE! Questo televisore contiene elementi specialmente sensibili all'elettricità statica (ESD).
Consigliamo di realizzare gli interventi sui circuiti integrati e sui semiconduttori con le dovute precauzione.

NOTE:
1.- Tutti i valori delle resistenze sono in Ohm, K=1.000, M=1.000.000.
2.- I valori de capacità indicati con un numero minori di 1 sono in uF maggiori di 1 sono in pF.
3.- Tutte le informaciond di questo schema sono corrette all'inizio della serie. Seguendo la propria politica di continuo miglioramento dei propri prodotti, la SANYO si riserva el diritto di apportare modifiche senza preavviso.
4.- Le miure di tensione e gli oscillogrami sono stati effettuati con la TV sintonizzata sul canale 21, regolazioni normalizzate e immagine del monoscopio.

Engineer SA CHK		SANYO	
Engineer SQ CHK		TITLE	SIZE
R&D CHK			A0
DOC CTRL CHK		BC7-A	
MFG ENGR CHK		CODE: ES CE14AT2	
Changed by: Administrator	Date Changed: Wednesday, April 5, 2006	Time Changed: 10:57:48 AM	QA CHK	REV: A	Drawing Number:	Sheet 1 of 1

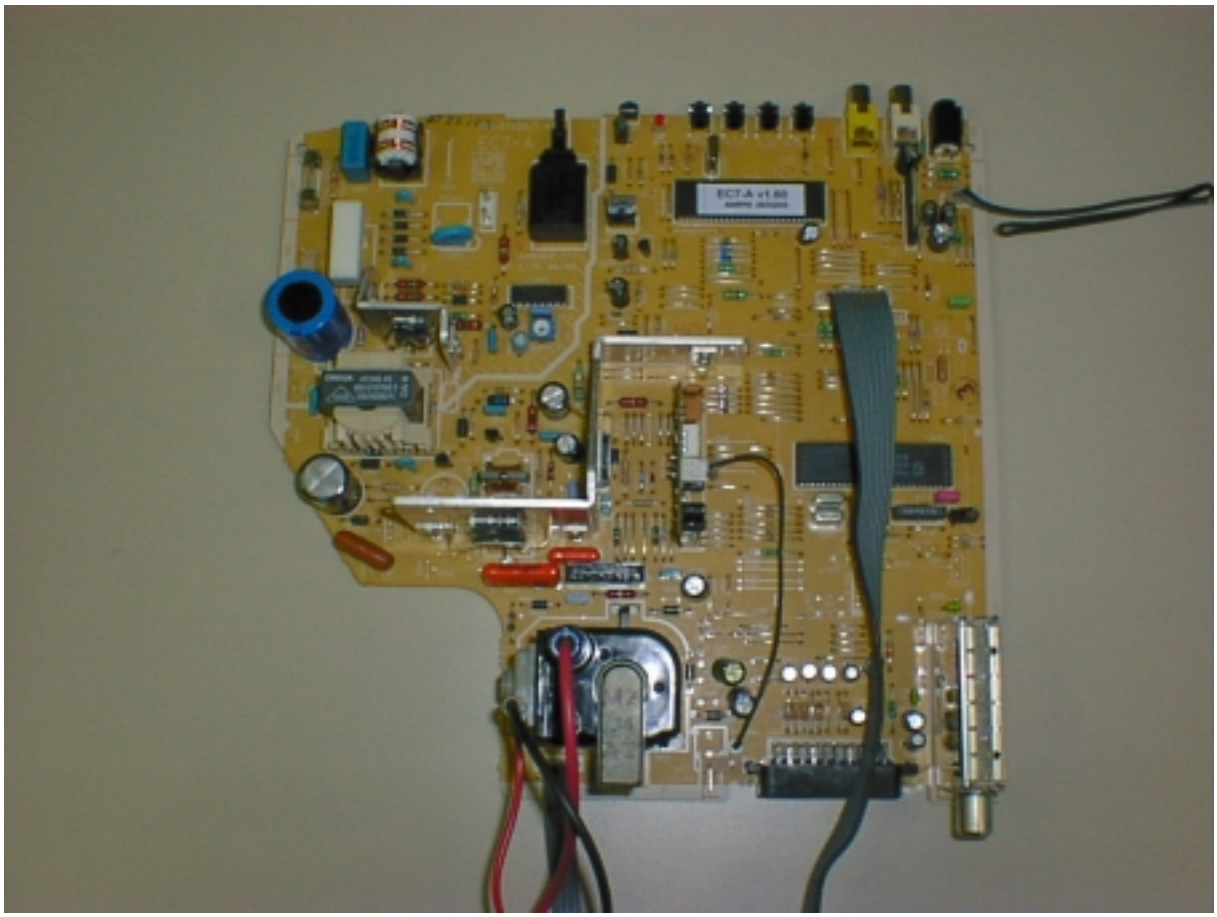
Service manual

Chassis description

Chassis 2112

Series EC7-A

Colour television



Note
This TV receiver will not work properly in foreign countries where the television transmission system and power source differ from the design specifications. Refer to the specifications for the design specifications.

16/06/2000

Ref. Nº **MS CHASSIS2112-I**

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1. SAFETY INSTRUCTIONS.

In order to understand correctly this service manual, it should be read along with schematic diagram of model under study.
All circuits from this chassis, with exception of primary side of power supply, are isolated from mains.

1.1 Warning.

An isolation transformer should be connected in the power line between the receiver and mains when a service is performed on the primary side of power supply. The deflection heat sink is connected to 12v.

1.2 Precautions against X-Rays.

The primary source of X-RADIATION in the television receiver is the picture tube. The picture tube is specially constructed to limit X-RADIATION emissions. For continued X-RADIATION protection, the replacement tube must be the same type as the original including suffix letter. Excessive high voltage may produce potentially hazardous X-RADIATION. To avoid such hazards, the high voltage must be maintained within specified limit. If high voltage exceeds specified limits, take necessary corrective action. Carefully, follow the instructions for +B1 volt power supply adjustment and high voltage adjustment to maintain the high voltage within the specified limits.

1.3 Recommendations to protect our environment.

STAND-BY MODE: In order to save energy and to maintain an optimum picture quality, it is advisable to switch off the TV using the ON/OFF button located at the front of TV set.
USED BATTERIES: The batteries in the remote control of your TV set do not contain mercury. However, SANYO recommends that you do not dispose of used batteries in domestic refuse. Please, contact your dealer or your local authorities for information regarding the disposal of used batteries or your nearest collection point.
RECOMMENDATION ABOUT THE END-OF-LIFE: Your SANYO TV set has been designed and manufactured using high quality materials which can be recycled and reused. In the future, when the life cycle of this set comes to an end, specialised companies can disassemble it and reuse certain materials. This reduces the impact of waste in our environment. Please, contact with your local authorities for information regarding the disposal of your set when the time arrives. Help us to conserve the environment we live in!.

1.4 Safety and EMC (Electromagnetic Compatibility).

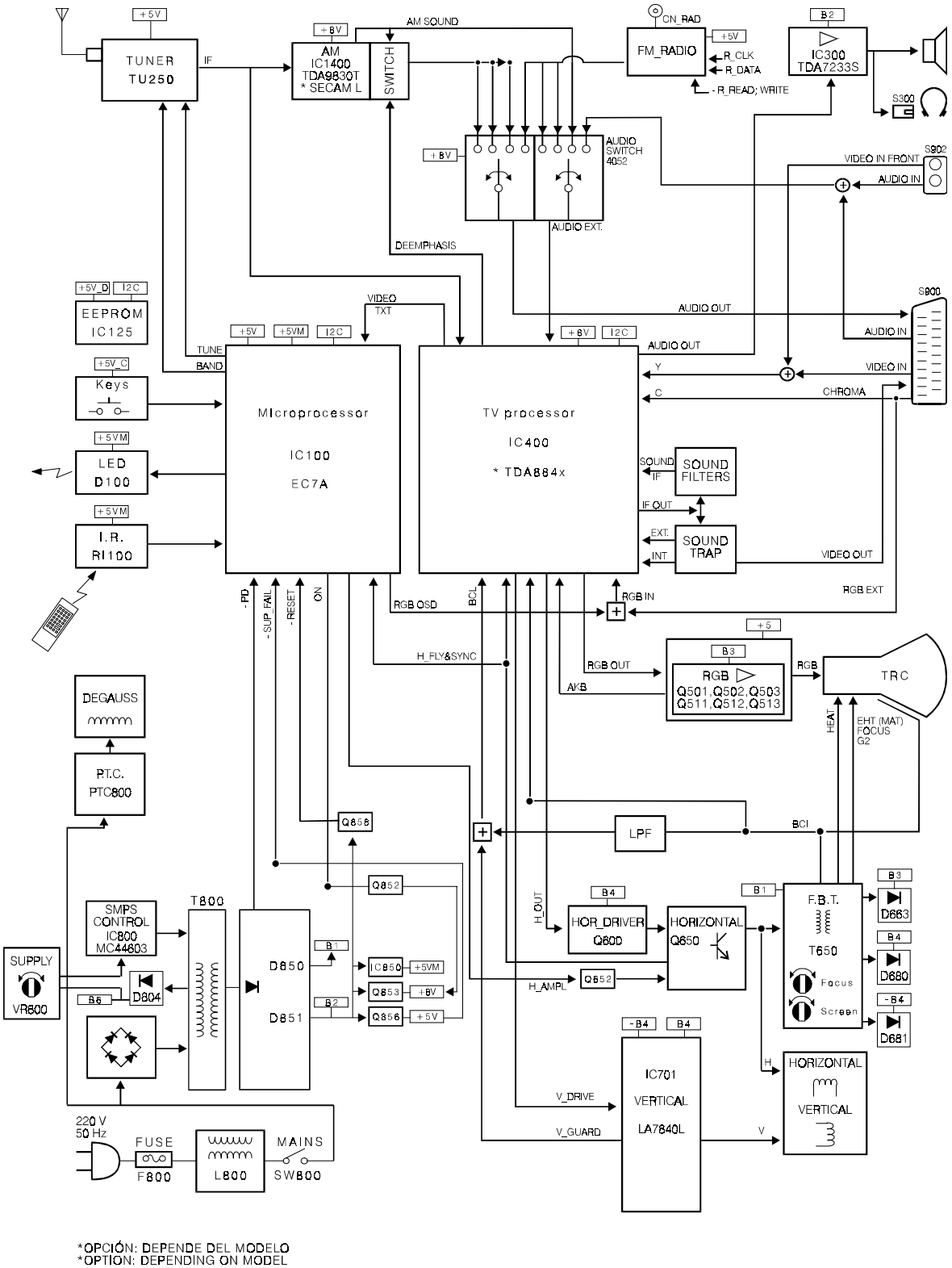
It fulfils the safety requirements established in the regulation: EN 60065:1993.
It fulfils the EMC requirements established in the regulation:
EN 55013:1990/A12:1994
EN 55020:1994
EN 60555-2:1987

2. TECHNICAL CHARATERISTICS.

Cathode-ray tubes	In-Line, Hi-bipotential gun. 14" (34 cm)
Tuning-system	Voltage synthesis, 100 programs in non-volatile memory, AFT, Fine-tuning (10 first programs), automatic, semiautomatic and manual channel-search. Band I, channels 2-4 (VHF)=E2-E4 Cable channels S1-S20 Hyperband channels S21-S41 Band III, channels 5-12 (VHF)=E5-E12 Band IV-V, channels 21-69 (UHF)=E21-E69
Reception system	B/G D/K, I, L, L' (depending on models)
Colour system	PAL, NTSC 4.43, N.A.P. (NTSC Amusement by PAL) PAL/SECAM (depending on models)
Program selection	Sequential selection from the controls on the set. Direct selection to any program from the remote-control device.
Audio	Power-rating 1W rms. (10% distortion)
Speakers	1 of 8 Ω.
Aerial	External aerial sockets 75 ohms. IEC
Jack for headphones	Mono jack 3,5mm.
Clock and alarm Function	
Timer Function	Switch on and off of CTV programmable in real time.
AV connectors	1 Scart connector 21 pin CENELEC standard AV, RGB and S_Video. 1 RCA Video input (frontal) 1 RCA Audio input (frontal)
Power supply	220 – 240 VAC 50Hz
Consumption	47W (maximum consumption). 29W (IEC 107-1) 3,1 W (Stand-by ⏻)
Text	1.5 FLOF and LIST level. 1 page memory.
Radio	87.5 - 108MHz. 40 memories. Manual and semiautomatic search
Hotel mode	Hotel mode and Hotel Rental
Options by means of Technical Service: Secam BG/L (depending on models), NTSC-M	

3. BLOCK DIAGRAM

EC7-A



*OPCIÓN: DEPENDE DEL MODELO
*OPTION: DEPENDING ON MODEL

3.1 Integrated circuits.

IC-100 (ST92195B1B1 in models with TXT): 8 bits microprocessor, with ROM memory incorporated, in that is located the program of TV control. It also incorporates the TXT management section.
IC-100 (ST92185B1B1 in models without TXT): 8 bits microprocessor, with ROM memory incorporated, in that is located the program of TV control.
IC-125 (KS24C081-CSTF in models with Radio): 8 bits EEPROM non-volatile memory. It memorises the data referring to the TV controls, configuration data, geometry adjustments, and tunings of TV broadcasting stations and tunings of FM radio broadcasting stations.
IC-125 (M24C04-MN6T in models without Radio): 4 Kbits EEPROM non-volatile memory. It memorises the data referring to the TV controls, configuration data, geometry adjustments, and tunings of TV broadcasting stations.
IC-300 (TDA 7233 S): Audio power amplifier.
IC-400 (TDA8841 in models PAL/NTSC): IF demodulator circuit, video processor, FM mono sound processor and geometry processor for multistandard signals.
IC-400 (TDA8842 in models PAL/SECAM/NTSC): IF demodulator circuit, video processor, FM mono sound processor and geometry processor for multistandard signals.
IC-701 (LA7840L): Vertical deflection power amplifier.
IC-800 (MC44603P): Switched power supply controller.
IC-850 (7805): 5V-voltage regulator, supply for the microprocessor.
IC 1400 (TDA9830T): AM sound demodulator circuit. (models with SECAM L and L')
IC1401 (HEF 4052BT): Analogic switch used to switch audio signals (in models with AM sound and/or with radio).

4. DETAILED DESCRIPTION IN BLOCKS

4.1 Power supply.

It is a switch mode power supply with "flyback" typology and with control in current mode. It is based on the MC44603P from Motorola (IC800) and a MOS external transistor (Q800) as a switch. Outputs from the source are following ones:
B1: About +106 volts for the deflection and MAT. Moreover, by means of a "switch" (Q851), opened in "stand-by", it is obtained the "+33V" volts used for the tuning TV and "+11V" volts for the tuning radio.
B2: It is about +10 volts. It supplies the following circuits:
Audio amplifier and a regulator of 5 volts for the microprocessor (+5V_M).
Regulator of 8 volts for signal processing and a regulator of 5 volts for the tuner and radio module. Both regulators are switched off in "stand-by" mode.
B5: Auxiliary output in the primary to supply the control signals that are needed for IC800.

4.1.1 Switched Mode Power Supply (SMPS).

4.1.1.1 IC800 controller start-up.

The supply to the start-up of IC800 comes from the C811 load through R805. When the voltage of pin 1 is higher than 14,5 volts (threshold voltage), the IC begins the oscillation (pin3). Once it has started, the increase of consumption of the integrated circuit is covered by B5 output. The current that circulates through R805 is not continuous, since as it is taken from one of the main poles, there is conduction only to half-waves, which allows maintaining reduced its dissipation.

4.1.2 Normal functioning ("on").

4.1.2.1 Duty cycle.

Each cycle begins with the entrance in conduction of Q800, which is cut when the current of the primary one has reached a certain level. From this moment, the diodes from secondaries of source enter in conduction until the energy stored in the core while the transistor conduction pass to the secondary; this is the moment where the output voltages from the "chopper" decrease to zero. Passing to zero is detected by IC800 (pin 8 "DEMAG. DETEC"), which starts a new cycle, provided that its oscillator (pin 10 "CT") decreases to a lower level. In opposite case it waits for it does it.

4.1.2.2 Regulation.

The power controller makes two regulations. The first one controls the peak current in the primary, in order to maintain energy level that goes to the secondary one in each cycle (current mode). If this were only made, the output voltages would vary based on consumption. In order to avoid it, there is a voltage regulation that controls the reference of the regulation in current: if the consumption increases, the output voltages tend to go down and the integrated circuit increases the current control setting to transfer more power.
The reading of the current is made measuring in pin 7 the power fail produced by the current when it goes through the resistances R820 and R821. This signal is applied to a comparator that controls the time of conduction of the transistor. The reference of the comparator comes from the output of the regulation in voltage as it is explained more ahead. This reference is limited internally to 1 volt. Therefore, in case of overconsumption in outputs, the maximum current possible in the primary side is the one that produces 1 volt in pin 7 from de IC. From that point, if there is an increase of the consumption, the output voltages decrease and the source remains protected. It is

important mark off that the good functioning of current control depends on the state of R811 and R812, which can be altered in case of failure of Q800.
Therefore, **whenever the transistor is replaced by failure, new resistances must change R811and R812**.
The regulation in voltage is made by means of the comparison of the signal in pin 14 (" VOLT_FEEDBACK ") with an internal reference of 2.5 volts. This comparator output is the goal for the current control. In addition, it is also connected at pin 13 ("E/A_OUT") in order to perform the frequency compensation of the feedback loop. Voltage at pin 14 comes from rectification (D804, C806) of the transformer primary output, by means of a voltage divider and the adjustment potentiometer VR800.
This maintains 2,5 volts at pin 14, therefore the power supply controlled output is the primary one (to a voltage that depends on VR800), remaining the other outputs only regulated by transformer ratio.

4.1.3 "Stand-by".

MC44603P has a stand-by mode based on the primary peak current measurement. If it does not arrive to certain level (programmable with R812), it switches to work at a fixed frequency of around 18 kHz (controlled by R813). The R812 value is chose by design to assure that when the TV goes to stand-by mode also the IC800 goes to this mode.

4.1.4 “+8v” and “+5v” regulators

4.1.4.1 Configuration.

They are lineal regulators that are disabled in stand-by mode. The configuration of the “+8v” has a differential amplifier configuration (Q859 and Q860) with Q853 as a transistor that drives the signal. The “+5V” (Q856 and Q857) has an emitter follower configuration. Both regulators use the “+5V_M” voltage (from IC850 [7805]) as a reference.

4.1.4.2 “stand-by” / ”ON” control

This control is done by means of the following signals and components chain: “ON” signal from the micro (activated at high level), Q852, Q851 (B1_L), “+8V” polarisation (R869) and “+5V” polarisation.
In order to achieve a correct IC400 (line oscillator) start-up is necessary that the “+8V” raises in ramp about 100ms. This is obtained with the integrator that Q850, and the circuitry associated to its base, forms with the “+8V” regulator. The weak load of the decouplings that there are in " +8V " also avoids a peak of discharge in B2 at the moment when the regulator switches on, because a peak in this point can activate the micro reset (Q858) and force the “ON” signal to a low level. In this case an on/off sequence will start, it is possible to detect it visually because the LED will be blinking each second approximately (it is not the ERROR_1 indication. When the micro indicates ERROR_1 the time between sparkles will be longer).

4.1.4.3 Regulator output short circuit protection.

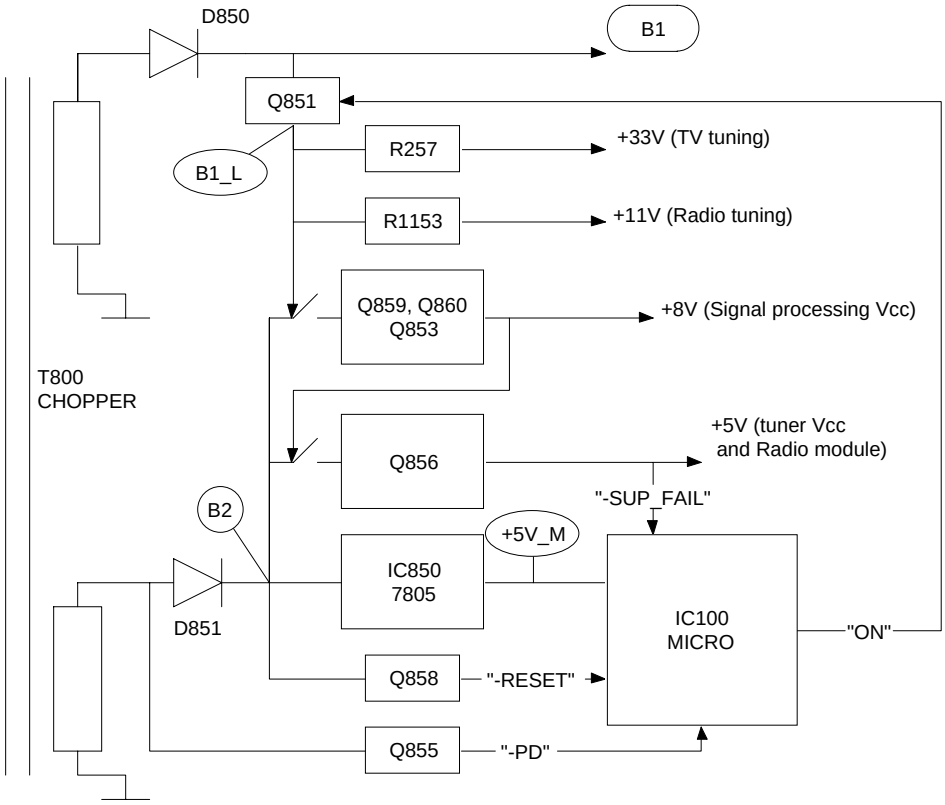
The chain described above allows the microprocessor knows if there is a short circuit at any output regulators. The microprocessor has to watch the “-SUP_FAIL”, so if “-SUP_FAIL” signal is at low level when the TV switches ON then the microprocessor deactivates the “ON” signal and the regulators will be also disabled. In this case the micro will indicate ERROR_4. But there is another possibility, the B2 supply can decrease enough to activate the microprocessor reset and the TV set will start the on/off sequence (explained before).

4.1.4.4 Mains switch off detection.

When the TV set is switched off, while C803 (primary electrolytic) is discharging, the microprocessor has to activate the speaker mute (to avoid the “pop” noise) and discharge the CRT. The C803 discharge is detected by means of secondary B2 winding because of the negative voltage of supply commutation pulses (this voltage reflexes, depending on the turn ratio, the primary voltage rectified). The used circuit to detect the switch off situation and generate the “-PD” signal for the microprocessor is Q855 and its periphery (negative level detection, filtering and comparison with a reference level).

4.1.4.5 Power supply signals and micro signals interrelation.

The following diagram describes the power supply and micro signals.



4.2 Teletext and microprocessor.

We can divide the main microprocessor (IC100) functions into four parts:
Management of the signals that arrive through the input ports.
Interact with the different parts of the circuit through the output ports.
Teletext management (only for ST92195 version).
Interface with the user through the OSD and the LED.

4.2.1 Ports description.

In the following table are listed the pins that are connected to some port, the related signal names and a basic description of its functionality.

Functionality.	**Input (I) or Output (O)**	**Active Level**	**Pin number (ST92195) TXT micro**	**Pin number (ST92185) Not TXT**	**Related signal.**
Power_Down indicator	I	L	1	1	-PD
Supply control (8V and 5V)	O	H	3	3	ON
Radio communication clock	O		4	4	R_CLK
Radio communication data	I/O		5	5	R_DATA
Radio Read/Write control	O		6	6	-R_READ/ WRITE
Not connected	-	-	7	7	-
SCART signal detection	I	A/D	8	8	SC
Supply failure (8V or 5V) detection	I	L	9	9	-SUP_FAIL
Audio signal selector	O	L	10	10	-RADIO
Audio signal selector	O		11	11	-AM/SCART
L' circuit activation	O	L	12	12	-LP/L
SCART audio output selector	O		13	13	-AM/FM
Horizontal deflexion failure detection	I	L	14	14	-DEFL_FAIL
I2C bus data signal	I/O		19	19	SDA
I2C bus clock signal	O		20	20	SCL

Functionality.	Input (I) or Output (O)	Active Level	Pin number (ST92195) TXT micro	Pin number (ST92185) Not TXT	Related signal.
BG system selection	O	L	42	28	CF1
DK system selection	O	L	43	29	CF2
Elimination of AGC feature during automatic tuning	O	L	44	30	-AGC_LS
LB band selection	O	L	45	31	-LB
MB band selection	O	L	46	32	-MB
Alarm	O	PWM	47	33	BEEP
HB band selection	O	L	48	34	-HB
Width adjust output (optional circuit)	O	PWM	49	35	WIDTH
Sound mute	O	H	52	38	MUTE
O: Led control I: Production test communication	I/O	L	53	39	LED
Tuning voltage	O	PWM	54	40	VTUNE
Infrared receptor signal	I		55	41	IR
Keyboard signal	I	A/D	56	42	KEY

4.2.2 Supply.

The number of supply pins depends on the version (with TXT or without TXT). A list of supply pins is shown in the attached table, indicating the number and the name of the pin.

Supply pin name	Pin number (Micro with TXT, ST92195)	Pin number (Micro without TXT, ST92185)
VDD	21	21
AVDD3	25	---
AVDD2	31	---
AVDD1	39	25

Where:
VDD → CPU supply (+5V_M).
AVDD1, AVDD2 → Analogic supply (+5V_M).
AVDD3 → Analogic supply (connected internally to AVDD1 and AVDD2).

4.2.3 Oscillator.

The oscillator is based on a quartz crystal of 8MHz (X100), which is connected to 50 and 51 pins (ST92195) or to the 36 and 37 pins (ST92185). It must oscillate whenever the +5V_M is present.

4.2.4 Reset.

This signal is active at low level. It initialises the microprocessor (whenever the supply is correct). Q858 and his periphery generate the reset signal. The reset is active when the B2 voltage is lower than 7.4 volts (approximately).

4.2.5 RGB output, character generator.

A character generator is integrated into the microprocessor. The outputs are RGB (pins number 17,16,15) and Fast Blanking (pin number 18). These outputs are active when the OSD or the TXT are present.

4.2.5.1 Character generator synchronism.

Signal	Pin number (Micro with TXT, ST92195)	Pin number (Micro without TXT, ST92185)
VSYNC	41	27
HSYNC	40	26

The character generator synchronisation is done with the VSYNC and H_FLY&SYNC signals.
The H_FLY&SYNC signal is used to synchronise horizontally the character generator. It is generated from the main flyback and it is AC coupled. At the Q651 emitter, there are 8 Vpp line frequency pulses synchronized with the main flyback. The horizontal position can be adjusted in the service menu.
The VSYNC signal is used to synchronise vertically the character generator. The information comes from the vertical retrace pulses generated by IC701.

4.2.5.2 RGB output voltage.

The RGB signals amplitude is 1V maximum. The Fast blanking output (VDS) amplitude is approximately 3V.

4.2.6 Teletext (only for ST92195 version).

The ST92195 microprocessor has a teletext decoder integrated. The parts of this circuit are Data slicer, decoder, memory (1 page) and character generator.

The microprocessor pins related to the teletext feature are:
- Video input (CVBS1 signal): pin 34.
- Teletext PLL adjust voltage: pin 29.

4.2.6.1 Non-interlaced.
When the TV shows the normal TXT situation (black background), the visualisation mode is not interlaced.
When the TV shows the mix/newflash situation (picture on the background), the visualisation mode is interlaced.
The selection between interlaced mode and not interlaced mode is done by an instruction via I2C bus.

4.2.7 –PD signal.
It is related to an input port. It is active at low level. The power down detector (Q855) actives it.
It indicates that the TV has been switched off and is necessary to start the switch-off process.

4.2.8 ON signal.
It controls the 8V-regulator output and the 8V regulator controls the 5V-regulator output. So that, if ON=1 there are 8V and 5V, but if ON=0 there are neither 8V nor 5V.

4.2.9 Radio control signals.
A NVM bit indicates whether the radio is mounted or not. It can be modified in the service menu.
The radio management is done by means of four signals:
- **-RADIO (pin 10):** Radio activation.
- **-R_READ/WRITE (pin 6):** =0 → read from the radio; =1 → write to the radio.
- **R_DATA (pin 5):** Data signal radio ←→ micro.
- **R_CLK (pin 4):** Clock signal radio ← micro.

4.2.10 SC signal.
It is related to an input A/D converter port. It changes between TV and AV, depending on the pin 8 SCART voltage.
The standard levels at pin 8 SCART are:
From 0V to 3.25V → TV mode.
From 3.25V to 8.25V → AV mode, 16/9 format.
From 8.25V to 12V → AV mode, 4/3 format.

4.2.11 –SUP_FAIL signal.
This signal comes from a 5V voltage divider. When –SUP_FAIL is at low level while the ON signal is at high level means that there is a +8V or +5V failure.

4.2.12 –AM/SCART signal.
This signal only acts when the IC1401 is present (there is AM sound or radio) because the SCART sound, the AM sound and the RADIO have the same management into the one chip (IC400).
Table of sound commutation:

-RADIO	-AM/SCART	SCART output	AUDEXT ONE_CHIP
L	L	RADIO	RADIO
L	H	AFOUT (IC1400)	RADIO
H	L	AFOUT (IC1400)	AMOUT (IC1400)
H	H	AFOUT (IC1400)	SCART

4.2.13 –LP/L signal.
Output port. The L' system is selected when it is at low level and the L system is selected when it is at high level.

4.2.14 –AM/FM signal.
This signal chooses the IC1400 output signal (AFOUT), selecting AM_IN input when it is 0 or EXT_IN input (that is the FM signal demodulated by the ONE-CHIP) when it is 1.

4.2.15 –DEFL_FAIL signal.
It is related to an input port. It is active at low level and managed by the horizontal deflexion protection circuit.

4.2.16 I2C bus and peripherics connected to (SDA y SCL).
All the circuits related to SDA and SCL (pins number 19 and 20 of IC100) signals are the I2C hardware.
The Integrated circuits connected to the I2C are the video processor (IC400) and the non-volatile memory (IC125). The most of the TV set functions are managed by I2C bus.

4.2.17 CF1 and CF2 signals.
Output signals that manage the sound standard selection (these signals are active at low level). CF1 selects the CF202 filter and CF2 selects the CF201 filter.

4.2.18 Tuning control signals (-AGC_LS, -LB, -MB, -HB, VTUNE).
The signals - LB (band VL), - MB (band VH), - HB (band U) are outputs active at low level, they select the tuning bands.

The VTUNE signal is the tuning voltage. Amplifying the 14 bits PWM signal generated by the microprocessor and low pass filtering generates the tuning voltage.
The –AGC_LS signal is active at low level. It only acts during the autotuning process. The main purpose is avoiding the AGC actuation in order to discard the weak signals.
The video identification signal and the AFC are read by means of I2C bus from the video processor.

4.2.19 BEEP signal.
Alarm control.
When the beep signal is active it is a 2 kHz square signal. It is added to the sound amplifier input, being able to generate a sound similar to the alarm clock one.

4.2.20 WIDTH signal.
Signal for the width adjustment.
It only acts when Q103 (and periphery) is mounted. This is an optional circuit, it exists as a prevision into the PCB, but it is possible it does not appear in the schema.

4.2.21 MUTE signal.
This signal output (that is active at high level) can cancel the sound acting on the audio amplifier input (headphones and speakers).
The change program mute and the mute from remote control is carried out by the video processor and managed by the microprocessor using an I2C message.

4.2.22 LED signal.
It is an output signal that controls de LED intensity; so if it is at low level the light radiated by the led will have more intensity than when the signal is at high level.

4.2.23 Customer instructions reception (IR and KEY signals).
The customer can act on the TV set via two ways: remote control and TV front keys.
The microprocessor detects when a key is pressed using the KEY signal.
The instructions coming from the remote control are detected by the infrared receiver (RI100) and interpreted by the microprocessor via the IR signal.

4.3 Horizontal deflection.

4.3.1 Driver stage.
The line outputs of video processor (pin 40 of IC400) is a squared signal at line frequency. This signal attacks the base of Q601, that is configured as transmitter tracker (it does not work in cut / saturation but in active). The output of base Q601 (transmitter) attacks the base of Q600 by means of C603.
Q600 governs the primary one of T600. In parallel with the primary side of T600 are: C601 and R601, key components that limit the Q600 collector maximum peak voltage and they also take part in shaping the Q650 base current.
The secondary side of T600 attacks the Q650 base (). L600 is basic and determines the slope of current extraction from Q650 base. Its value is defined to cut down the losses of Q650 switching.
T600 is of course a very important component, too. Its construction determines the turn ration as well as a concrete loss inductance, very low.

4.3.1.1 Driver stage power.
The driver stage supply is the voltage +12V, (by means of R606), that comes from a secondary side from the line transformer (T650). This secondary side gives a negative flyback. The DC voltage is obtained rectifying this output by means of D680 and C701. The DC voltage measured by a tester in driver supply is 11,6V, approximately. The capacitor C600 has been chosen of a small value since it allows a fast transition without problems of 2fh to fh. With this value, the supply voltage ripple of the driver is 3,5V approximately.
The values of R600 and R606 are fit to correctly determine the Q650 base current. D606 avoids that the vertical integrated is supplied by B2 voltage, in STAND-BY mode.

4.3.1.2 Driver stage start-up.
Given that when starting the supply of lines does not exist, the start-up of the driver stage, in principle it would not be possible.
In order to make possible the starting, an initial supply is given, which comes from B2. When the line stage starts working D600 is conducting, giving a current supplied from B2 (limited by R600) and feeding the driver stage. Once the voltages of the FBT secondary outputs achieve their final value, D600 will be cut off.

4.3.2 Line stage.
It is a stage with diode modulator similar to the used one in deflection of 110º. This circuit, composed by C651, C656, D661 and D662, it allows to compensate the variations of image width when it varies the current in the tube (effect ' breathing'). As well, it allows cut down the oscillations produced in the deflection when there is a bright horizontal line and when in the following lines have some information with little luminosity (‘mouse-teeth’ effect).
C653 the ‘S’ correction capacitor and L652 is the linearity coil.

The used high voltage transformer (T650) is Slot technology and it does not incorporate bleeder (internal resistance to unload the MAT).

4.3.3 Width adjustment.

In this chassis the width adjustment only exists as forecast in the printed circuit and in the control software; but it is not mounted but it is optional (maybe it does not appear on the scheme).
The width adjustment is totally different from the used one until now in 90º deflections, width adjustment coil or 110º; stage E/W. The adjustment is made from the Service Menu, changing the H.AMPL. value. The microprocessor generates a PWM signal with a duty cycle proportional to the value of H.AMPL. registry. Q654, C658, C659, D653, Q653, Q652 and D654 compose the circuit that allows the adjustment, it modifies the voltage wave form at the central point of the diode modulator producing a change width of picture.

4.3.4 H_FLY&SYNC signal generation.

This signal is used to achieve the horizontal synchronisation. The microprocessor uses it to synchronise the RGB insertion and the video processor for the RGB blanking and as PHI-2PLL input.
It is generated from the main flyback with AC coupling. There are some pulses in Q651 transmitter, with line frequency and synchronized with the main flyback, with a width of 8V.

4.3.5 Recovered line voltages.

From the flyback transformer (T650) some supply voltages are extracted:

- ±12 V, used by the vertical amplifier and by the driver stage.
- B3 (130 V), used by final RGB amplifiers.
- Heaters.

4.3.5.1 Heater supply.

The T650 voltage and the R573 value determine the heater supply voltage. In order to maintain the heater supply within right limits, the B1 adjustment (line supply) must be as the specified one, and both deflection values and R573 must be as the specified ones. A heater supply voltage excessively high, it reduces considerately the tube life.
In case of measuring the heater supply voltage, it must be done by a special voltmeter that has to accomplish the following characteristics: minimum crest factor of 10 and minimum bandwidth of 5MHz. Portable multimeters hardly fulfil these characteristics.

4.3.6 EHT discharge.

The EHT discharge is carried out by means of the following procedure: before switching off the TV set, the microprocessor sets to 1 a bit in video processor (IC400) by means of I2C bus. These bit provokes that the video processor duplicates the line frequency for 160 mS at the same time it moves the RGB outputs to white.
The result: the flyback height cuts by half when the line frequency is duplicated, it provokes that the line transformer (T650) generates an EHT of half the normal working value, approximately. When the current beam conducts (RGB outputs are white), there is EHT consumption, what causes the descent from its normal working value to something less than half. A complete EHT discharge is not carried out; therefore it has to be totally discharged before removing the EHT vent.
There are two visual aspects of EHT discharge (eligible by OSO from Service menu):

- Discharging when the vertical deflection circuit is working: A white narrow strip with retrace lines is observed.
- Discharging when the vertical deflection circuit is diverted upwards: a while halo is observed in the top of the screen.

In case of switching off the switch (or removing the mains), the circuit that generates –PD signal (formed by Q855 and its periphery) advises, in advance, that the microprocessor is going to remove the mains. It remains a while of working before the source stop oscillating (due to energy stored in C803). This while is enough to the microprocessor carries out the procedure of switch off and discharge of EHT.

4.3.7 Protections.

The protection of horizontal deflection is enabled when –DEFL_FAIL (pin 14 of IC100) has a low level. The microprocessor reads this signal value and, in this case, it sets the TV in ERROR_3.
The protection of horizontal deflection is disabled in these cases:

- I2C BUS STOP is chosen in service mode.
- The TV set is in Stand-By mode.
- During the switch on /off transients of the TV set.
- In forced switch on mode.

4.3.7.1 Low Flyback protection.

If there is a flyback too low (it happens when the deflection coil path is opened or when there is an internal short-circuit in T650), D561 stops conducting and, therefore, –DEFL_FAIL signal resets to low level.

4.3.7.2 Heater short-circuit protection.

If there is a heater short-circuit, D561 stops conducting and, therefore, –DEFL_FAIL resets to low level.

4.3.7.3 Beam current overconsumption protection.

The overconsumption of beam current (when there is a short-circuit to ground, for example) provokes that the BCI signal decrease underneath 0V permanently, entering in conduction D504 and D505. This provokes that –DEFL_FAIL signal resets to low level.

4.3.7.4 C656 open-circuit protection.

If C656 is opened, the final result is the EHT voltage goes up until a dangerous level that can damage both the FBT and the tube. The circuit formed by Q611 and its periphery carries out short-circuiting the V_GUARD signal to ground when flyback pulses, at central point of the diode modulator get over a certain peak level. In this case, ERROR_2 is shown.

4.4 Vertical deflection.

The amplifier of vertical deflection is the integrated circuit LA7840L.
The output signal that comes from IC400 (balanced, +V_DRIVE and -V_DRIVE signals) is applied to R711, R712 and to the outputs of IC701. Later, it is amplified by IC701 and applied to the deflection coil.
R702 the sensing resistor. It is a Metal Film resistor in order to give stability in temperature and to avoid the drifts. Its value defines the height and it is optimised for each tube. Resistors R711 and R712 define also the height. In case of changing anyone of these three resistors, they should be replaced by the same type as they are.
R705 is the damping resistor of the deflection coil.
The amplifier is the DC coupler (there is no coupling capacitor), therefore to achieve that the deflection coil current conducts in both sides, the supply of IC701 must be symmetrical. The advantage of the DC coupler is avoiding the linearity N/S mistakes (consequently, there is no linearity N/S adjustment).

4.4.1 Vertical deflection suppliers.

There are two power supply voltages for the vertical deflection:

+12 → it is used to give current to the top half of the screen.
- 12 → It is used to give current to the bottom half of the screen.

To generate the flyback pulses, it is used the pump-up circuit of voltage integrate in IC701. It allows flyback levels of 38V in the outputs from a symmetrical power supply of 12V.

4.4.2 Vertical deflection protection.

Whenever there is a failure in the vertical deflection circuit that is a danger, the vertical flyback disappears.
The vertical flyback is fed back towards pin 22 of IC400 by means of V_GUARD signal. In the case of lacking the pulses of vertical flyback, the video processor (IC400) activates a bit that is checked through bus I2C by the microprocessor, periodically.
When the reading indicates anomaly, the microprocessor shows ERROR_2.
The vertical protection is disabled in these cases:

- V-STAT or I2C BUS is selected in service mode.
- The TV set is in standby mode.
- During the switch on / off transients of TV set.
- In forced switch on mode.

4.5 Beam current limiter and geometry compensations.

4.5.1 BCI signal generation.

Signal BCI reflects the beam current of the tube. The absence of beam current causes that in BCI there is a voltage near 8V. The greater is the beam current, the less is the BCI voltage. This information is used for the geometry compensations, as well as for the ABL.
The time constant of BCI signal should be around 0,5mS so that it can be used in the geometry compensations. In order to be able to obtain this time constant (quite fast), the connection of the return path from the CRT (aquadag) is connected to BCI signal. Therefore, the CRT aquadag is not ground.

4.5.2 Geometry compensations.

4.5.2.1 Width and height compensation.

Through R425 BCI signal is taken to pin 50 of the video processor (IC400).
The compensation of height is made varying the amplitude of +V_DRIVE and - V_DRIVE signals, according to the voltage level in IC400 pin 50.
The compensation of width takes place by means of the diode modulator. With greater beam current, the voltage between terminals of C673 decreases, being in a reduction of the width that compensates the increase produced by the reduction EHT voltage.

4.5.2.2 Phase compensation.

Due to variations in the beam current, the horizontal flyback width changes. The video processor dispose of a phase comparator to correct the position of the image in the screen due to variations in time of storage of line transistor, but it is not able to compensate the variations in the width of horizontal flyback. This causes distortions in the picture due to phase deviation.
Though R416 the BCI signal is taken to pin 42 from the video processor (IC400). In this pin, the capacitor is connected to give the time constant in the second phase comparator. Extracting current from this pin, the picture

phase is moved towards the left and injecting current it is moved toward the right. So, the distortions, due to phase deviations, are corrected

4.5.3 ABL description.

The ABL is the limiting circuit of average beam current. The goal of this circuit is avoiding that the average beam current surpasses the 870 μA. This takes place reducing the resistance and the brightness, in case of being necessary.

4.5.3.1 BCL signal generation.

R682, R683, R688, C674, C675, C676 and C678 form a low-pass filter that filters the BCI signal. From it, a continuous voltage is obtained that is applied to the base of Q673, which is formed like an emitter follower. The signal BCL is present in the Q673 transmitter.

4.5.3.2 Contrast and brightness reduction.

The contrast reduction (and eventually of the brightness) is carried out by the video processor.
The BCL signal is applied by means of D400 and R430 to pin 22 of video processor (IC400). This pin has two functions: During the vertical retrace it is the V_GUARD input (see Vertical protections), and during the sweeping it is the input of beam current limiter (see description of the video processor).

4.6 Tuner and tuning circuit.

The tuner TU250 allows the reception of all TV by broadcasting and via cable. For it, it distributes all the rank of channel frequencies in three bands (LB, HB and U) whose selection is carried out by the microprocessor (IC100).
The tuning is a synthesis voltage type: the tuned channel depends on the tuning voltage. This one is a continuous voltage in the rank of 0V to 28V approximately. This voltage initially is generated by the microprocessor as width modulated pulse train (PWM) that later it is amplified and low-pass filtered by the circuit whose active components are D250 and Q251. The automatic frequency control (AFC) is carried out by the microprocessor checking the tuning voltage based on two bits provided by the video processor, IC400, that they contain information about the difference between the tuned frequency and the right frequency. (See the section “video IF” later on). The tuner gain is controllable by the AGC continuous voltage. This voltage is generated by IC400 and makes the automatic control of gain is made. (Also see section "Video IF").

4.7 Video signal processing.

4.7.1 Video processor.

The video processor is IC400.
Inside IC400 there are the following blocks:

- Video IF
- Mono sound (not used in this chassis)
- Horizontal and vertical synchronisation.
- Geometry processor.
- Video filters and switches.
- Colour decoder.
- RGB Processing.

4.7.1.1 Video processor versions.

The possible versions of video processor are
TDA8841 → used in deflection 90ºmodels without SECAM.
TDA8842 → used in deflection 90º models with SECAM.

4.7.1.2 IF video.

The following sections are in the IF video:

- IF amplifier.
- PLL and VCO demodulator.
- Video buffer.
- AGC.
- Tuner AGC.
- AFC
- Video Identification.

The signal that comes from the tuner output (TU250) is applied to the surface acoustic wave SF200, which lets pass the carriers with information of sound and video. The output of SF200 is applied to IF amplifier which has symmetrical inputs.
The IF signal is demodulated with a PLL detector. The PLL is used to generate a reference signal that is in phase with the video carrier. The demodulation is obtained multiplying this reference with the IF signal. The demodulator can handle positive video (case of SECAM L/L') and negative video (the rest of the TV systems).
The VCO does need neither adjustment nor external coil. The frequency selection is carried out by the microprocessor by means of bus I2C. The components related with PLL are the connected ones to pin 5 (PLLLF).
The video buffer adapts the levels and output impedance so that the signal can be later treated. The demodulated video goes out by pin 6 (IFVO) and has a typical level of 2Vpp.

The AGC controls the gain of IF amplifier so that the video amplitude maintains constant. The modulated video is taken to an AGC detector, which controls directly the gain of IF stages. The AGC time constant is determined by the capacitor connected to pin 53 (DECAGC).
The AGC of tuner reduces its gains in case of receiving strong signal from R.F. The point in which the gain reduction of the tuner begins is programmable via I2C (AGC in service menu).
The AFC information is available in two bits. They are accessible for the microprocessor via I2C. This information is used in the tuning and pursuit of broadcasters.
The section of video identifications controls several bits that are accessible for the microprocessor via I2C. This information is used both in the tuning of channels and in the mutes management.

4.7.1.3 Horizontal and vertical synchronisation.

There are the following sections in synchronisation:
- Horizontal synchronism separator.
- Horizontal oscillator.
- PHI-1 detector.
- PHI-2 detector.
- Horizontal output.
- Coincidence detector.
- Vertical synchronism separator.
- Vertical divider with counter.

The input to horizontal synchronism separator is the video signal selected (the video that is on the screen). The synchronism separator slices synchronism pulse in the mid point. The DC level is fixed to the video input. The black level is stored internally.
The horizontal oscillator is internal, there are no external components related to it. The adjustment of its nominal frequency is made with an internal calibration circuit that uses as reference the quartz crystal of 4.43MHz connected to pin 35 (X400). The horizontal oscillator generates a sawtooth signal to the double of the line frequency. Once calibrated, the oscillator is controlled by PHI-1 loop with the intention of synchronising it with the signal of video input.
The PHI-1 detector is a PLL circuit that synchronises the horizontal oscillator with the video input signal. The components related to PHI-1 are the connected ones to pin 43 (PH1LF). The time constant of PHI-1 is controlled by the microprocessor via I2C, as well as by the noise detector.
Detector PHI-2 provides a stable position of the picture in the screen. It is necessary because the time of storage of the line transistor (Q650) varies with the beam current, causing different delays in the deflection circuit. The PHI-2 detector compares the horizontal oscillator and the horizontal flyback signal generated by the deflection (it enters by pin 41, FBISO). PHI-2 produces a time shift of the horizontal output (pin 40, HOUT), thus keeping stable the picture position on the screen. The components related to PHI-2 are the connected ones to pin 42 (PH2LF). The picture phase is adjustable via I2C (H. SHIFT in the service menu).
The horizontal output (pin 40, HOUT) is an open collector type. In normal conditions it has a duty cycle of 45% in high level and 55% in low level. In the start-up transient has a frequency of 31,25KHz, after 50mS it changes to its nominal frequency. With this, a soft start-up of the horizontal deflection is obtained. In the stop transient, it changes its nominal frequency to a frequency of 31,25KHz. This, combined with the activation of the RGB, discharges the EHT. It also provides a soft deflection stop.
The coincidence detector enables a bit when the video signal is synchronized with the horizontal oscillator. This bit is accessible for the microprocessor via I2C. This bit is used in the mutes' management.
The vertical synchronism separator separates the vertical synchronism pulse from the video input signal. This pulse is used later to trigger the counter system for the vertical.
The vertical divider uses a counter that provides the timing for the ramp generator in the geometry processor. The clock of the counter is taken from the horizontal oscillator. This system assures a good interlace.

4.7.1.4 Geometry processor.

In the geometry processor block, there are the following options:
- Vertical ramp generator.
- Vertical geometry processor.
- Horizontal geometry processor (E/W).
- Geometry compensation.

The vertical ramp generator provides the reference signal for the vertical and horizontal geometry processors. A current reference is generated internally in order to load the ramp capacitor. R426 is connected to pin 52 (IREF) and it is used to generate the current reference. It is a Metal Film resistor with 1% tolerance in order to give temperature stability and minimise the spreads of picture geometry. C425 is connected to pin 51 (VCS) and it is the ramp capacitor. It is made of polycarbonate to give temperature stability.
The vertical geometry processor generates the signal that outputs balanced by pins 47 (VDRA) and 46 (VDRB). Later, this signal is amplified and taken to the deflector coil. The adjustment parameter is accessible via I2C (V.SLOPE, V.AMPL, S-CORR, V.SHIFT in service menu).
The geometry compensation input (pin 50, EHTO) modulates the dimension of the vertical signal to maintain stable the height of the picture in the screen.

4.7.1.5 Video filter and switches.

In video filters and switches block, there are the following sections:

- Video signals selector.
- Filter calibrator.
- Chroma band-pass filter and automatic colour control.
- Chroma trap.

The video signals selector selects the video inputs (pin 13, CVBS_INT; pin 17, CVBS_EXT; pin 11, CVBS/Y and pin 10, CHROMA). The selection is made by the microprocessor via I2C. The selected video is sent for further processing (filters), at the same time it outputs at pin 38 (CVBSO).

The filter calibrator is a circuit that calibrates the filters each frame retrace. The calibrated filters are the chroma band-pass filter and the luminance trap.

The selected video signal is sent to the chroma band-pass filter via an amplifier whose gain is variable and it is controlled by the automatic colour control. The information input for the automatic colour control is the chroma burst signal. The circuit maintains the colour saturation in different amplitudes of chroma. The band-pass filter output is applied later to the colour decoder.

The selected video signal is also sent to the chroma trap. When coming out of the chroma trap there is the sharpness block (peaking) and noise filter (coring), that are programmed by the microprocessor via I2C. The output signal resulting is sent to pin 28 (LUMOUT), where there is applied a band-pass filter formed by L404, R428 and C422. Both the chroma trap and the band-pass filter are disabled when the signal has a Y/C form (coming from a S-VHS video).

4.7.1.6 Colour decoder.

In the colour decoder block, there are the following sections:

- PLL/VCXO.
- PAL/NTSC demodulation.
- SECAM demodulation.
- System automatic management.

The PLL works during the burstkey time lapse. It generates a VCXO reference signal, which is in phase locked to the chroma burst of the selected video signal. For this, it is used the quartz crystal (X400) connected to pin 35. The components related to PLL circuit are the connected one to pin 36 (DET).

The reference signals coming from VCXO are supplied to the phase rotator (hue control), and later both supplied to the R-Y and B-Y demodulator and to the colour identifier. The band base signals R-Y y B-Y is taken to the delay line via PAL/SECAM switcher. The output of the delay line goes to pins 30 (RYO) and 29 (BYO).

The SECAM demodulation is carried out with a PLL demodulator. The reference voltage, generated in pin 16 (SECPLL), is regulated so that the PLL demodulator output is set at a reference voltage generated internally. Being outside the calibration, the oscillator tracks the SECAM chroma, giving as a result the corresponding demodulated signal. The base band signals R-Y and B-Y are taken to the delay line via PAL/SECAM switcher. The system automatic manager identifies what kind of chroma is being demodulated. Its output is accessible for the microprocessor via I2C.

4.7.1.7 RGB processing.

In RGB processing block, there are the following sections:

- Dematrixing R-Y / B-Y.
- RGB selector.

R-Y / B-Y signals are taken to two amplifiers whose gain is programmed by the microprocessor via I2C (colour control by the user). The outputs of these amplifiers are taken along with the Y signal to the matrix, where the RGB signals come from.

The RGB selector is controlled by the FB signal, which enters through the pin 26 (RGBIN). The RGB selection is made between the RGB matrix outputs and the inputs of external RGB (pins 23, RI; 24,GI; 25,BI). The RGB selector output is taken to the RGB control.

4.7.1.8 RGB control.

In RGB control block, there are the following sections:

- Contrast control.
- Brightness control.
- Beam current limiter and vertical protection.
- Cathode self-calibration (AKB).
- Amplitude excursion adjustment and white control.

The RGB signal that comes from the RGB selector goes to Contrast and Brightness control blocks, which are programmed by the microprocessor via I2C (user control). The output of these blocks is given to the cathode calibration block (AKB). Both controls can be shorten by the beam current limiter. The pin 22 (BCLIN) is input with double function: during the vertical retrace is a vertical protection input and during the sweeping it is a beam current limiter.

If during the vertical retrace there is a level less than 3,7V, the video processor understands that there is a vertical failure and then the video processor considers there is a vertical failure and it activates a bit that is read by the microprocessor via I2C.

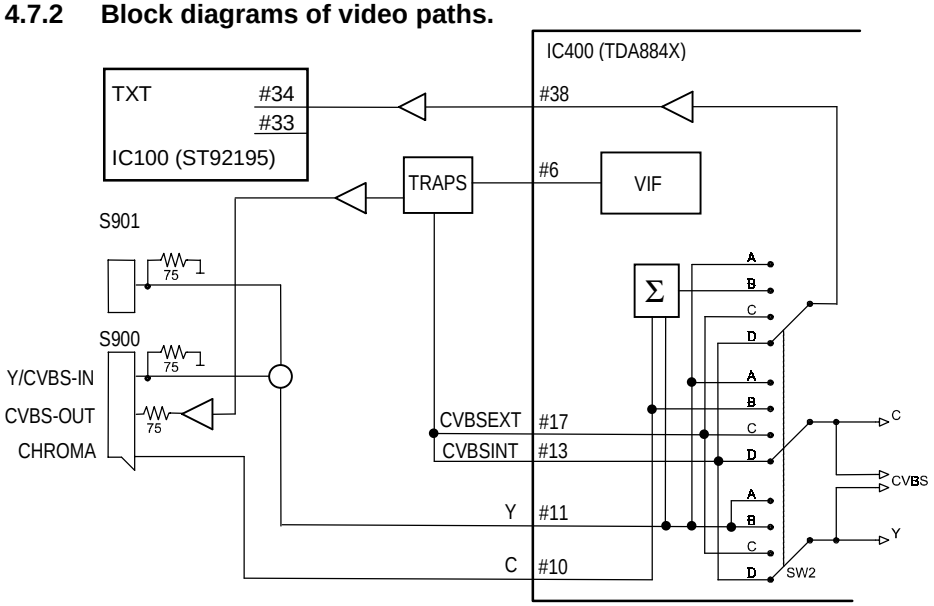
During the sweeping, the resting voltage is 3.4V. The ABL circuitry (formed by Q673 and their periphery) reduces this voltage if it is necessary. The contrast reduction begins when the voltage of pin 22 (BCLIN) is lower than 3V. The brightness reduction begins when the voltage of pin 22 (BCLIN) is lower than 2V.

- **Cathode self-calibration (AKB)** is carried out by means of two point's stabilisation loop. A stabilisation point is the black level one (cut-off, polarisation) and the other is the white level one (gain). Each cathode is calibrated sequentially and independently. The stabilisation of the black level and the white level takes place in alternating fields (black - white - black - white…). The system feedback signal enters through the pin 18 (BLKIN). Through this pin enter the cathode current, which is supplied by the RGB amplifier by means of AKB line.
- **Black level stabilisation (polarisation):** Before the blanking field, three pulses are inserted sequentially in RGB outputs (a pulse in each line). A servomechanism adjusts the polarisation of RGB outputs until obtaining that 8uA enters in each of the three pulses through pin 18.
- **White level stabilisation (gain):** After the blanking field, three pulses are inserted sequentially (a pulse in each line). Another servomechanism adjust the gain of three amplifiers (R, G, B) so that it stabilises a reading of 20uA (BLKIN) in the three pulses through pin 18. It implies that the cathodes final excursion does not depend on the gain of the RGB final amplifier. The excursion adjustment of cathodes is made changing the amplitude of RGB signal along with the sensing pulses. The microprocessor writes via I2C an adjustment that determines this amplitude and it has the same effects in the three amplifiers (K-DRV in Service mode). In the same way, but independently for each channel, the adjustment of the white balance is made. The microprocessor writes via I2C three adjustments that affect independently to each one of the three colours. The adjustment of G and B is accessible in way service (the red one is prefixed to a certain value).
- **Tube start-up:** When the TV set starts to work, the microprocessor monitorises, via I2C, a bit that indicates whether the servo is stable (it only will be stable when there is cathodes transmission, that is to say, when the heaters are hot and the polarisation G2 is right). When the servo is stabilised, a picture is shown up.

4.7.1.9 Supply and Bandgap.

The supply is 8V and enters by pins 12 (VP1) and 37. The ground pins are the 14 and the 44 ones. Internally a stabilised voltage is generated in temperature. This supply is called "Bandgap", and its decoupling is the components connected to pin 9 (DECBG).

4.7.2 Block diagrams of video paths.



4.8 Audio signal processing.

4.8.1 Audio processor.

The audio processor is integrated along with the video processor IC400. This component is controlled by the microprocessor (IC100) by means of the I2C bus. Some of the basic functions, the audio processor carries out, are:

- Demodulation of IF audio signal. The band-pass filter must be connected externally. The audio signal outputs through a limiter circuit and it is demodulated by means of a PLL, which auto-tunes automatically to the carrier of the output signal. It is not necessary carry out any adjustment. This demodulation is only possible for FM sound.
- The volume control is made by means of I2C bus.
- The deemphasis output gives an audio signal with a fixed level. It needs an external capacitor (C407).

In addition, for TV sets with standard of AM sound the audio signal must be demodulated externally.

4.8.2 AM sound.

Only for models with standard L.

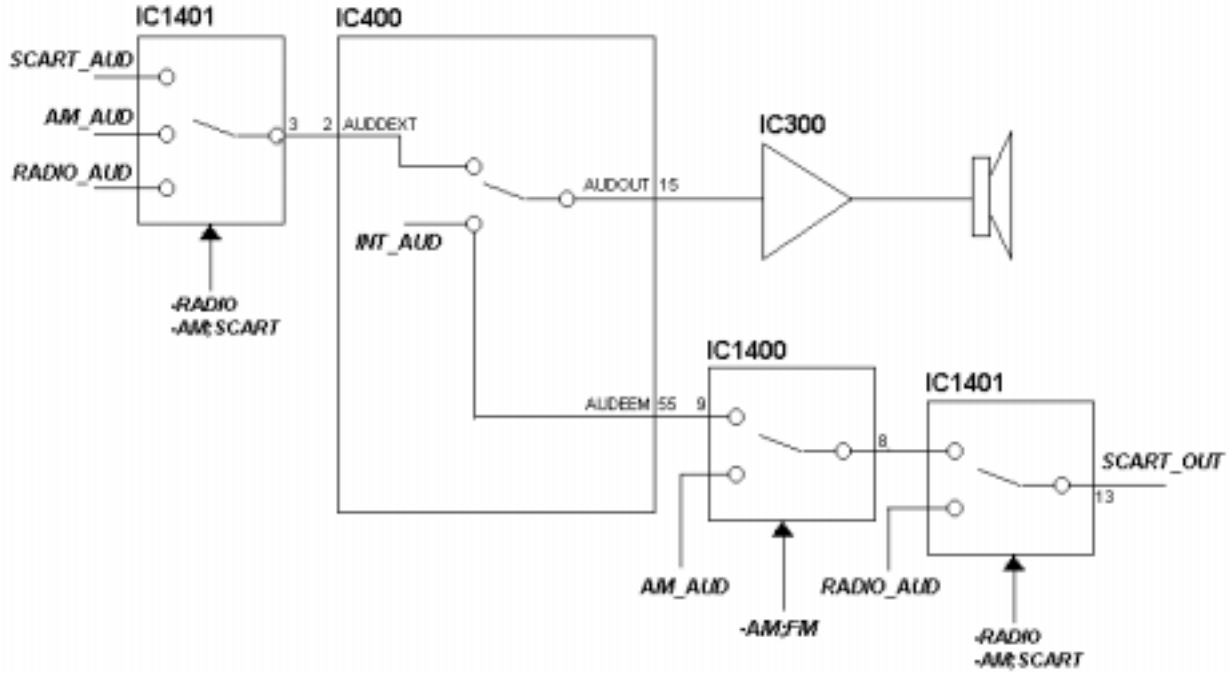
The IF of AM sound is basically formed by IC1400, integrated circuit TDA9830T, and by the surface acoustic wave SF1400. Its input is the output of tuner intermediate frequency. Its output is the AM demodulated monaural audio signal.
The operation is the following: the surface acoustic wave SF1400, it has an only one resonance at the carrier frequency of the AM modulated sound signal; therefore, it only allows the pass of this signal, which is regenerated and self-multiplied, giving as result the demodulated signal. This circuit does not require adjustments.

4.8.3 L' system.

The L' transmission system, used in France, differs mainly from L system in the signal spectrum, which is in frequency inverted and it is only used in channels of band I. This is why in the tuning menu of TV sets with L' system, when the system is France, there is an additional band, *VL'*. It covers the same channels as band *VL* but in band *VL* reception is made in system L'.
In order to carry out the signal reception with inverted spectrum, what must be done in this chassis is to change the intermediate frequency of the picture carrier of 38,9 MHz from the rest of systems to 33,9 MHz. Therefore, the surface acoustic wave of picture, SF200, is intended to work both frequencies of picture carrier in TV sets that have this system.
As far as the sound, the intermediate frequency of its carrier changes from 32,4 MHz with system L to 40,4 MHz with system L'. Therefore, in TV sets with system L', the surface acoustic wave, SF1400, can be switched between both frequencies by the microprocessor, by means of the circuit associated to D1200 and D1201. The control signal is - LP/L

4.8.4 Audio switching.

The audio switchings are carried out by means of: IC400, IC1401, IC1400 and by –RADIO (pin 10 de IC100), –AM; SCART (pin 11 de IC100) and –AM; FM (pin 13 de IC100) signals.
IC400 allows selecting between a FM sound coming from the tuner signal and an external audio signal. The audio supplies are three, SCART audio (S900) in parallel with the frontal RCA (S902), AM audio for TV sets with SECAM L standard and audio of FM radio for models with radio. The audio output through the SCART can be sound from the tuner, radio sound or AM sound. The table and the diagram of switchings, that allow all these possible combinations, are the following ones:



-RADIO	-AM; SCART	-AM; FM	External Audio selected	Speakers output	SCART output
1	1	1	Frontal SCART/RCA	Tuner or AV (depends on the user)	Tuner
1	0	0	AM	AM	AM

0	1	Depends on the tuner signal system.	RADIO	RADIO	Tuner
0	0	X	RADIO	RADIO	RADIO

4.8.5 Speaker amplifier.

The speakers amplifier is based on the integrated circuit TDA7233S (IC300). It is the amplifier of one channel, supplied by B2 and with a gain fixed by resistor divider R319/R316. The power supplied is approximately 1Wrms at 10% distortion.

The input (pin 4) comes from the audio processor (IC400). The power output for the speakers is in pin 1.

A mute is performed in this IC by unbalancing its output. When the MUTE line, coming from the microprocessor, is a high level the voltage at pin 3 of the amplifier is bigger than the internally fixed level, with which the output remains unbalanced. This mute is only used when TV set is switch on or off and when some times there is a bad reception of TV signal, with the purpose of avoiding noises. Under any other circumstances, the audio processor, IC400, carries out the mute function.

4.9 RGB amplifier.

It is a class 'A' configuration carried out with the transistors Q501, Q502 and Q503. Q570 and the divider, formed by R571 and R572 carry out the voltage reference for the amplifiers. The reference voltage is 1,8V. The amplifiers supply is the voltage B3, generated in the FBT. The transistors Q511, Q512 and Q513 sink the current from each cathode towards a common point. The sum of all these currents is conducted through the line AKB toward the processor of video where will be measured. The video processor compensates the possible variations in the chain of RGB, modifying the exits of RGB. More details see the chapter 'Video processor'.

4.10 CRT socket connector.

The tubes can have internal discharges; they go from the anode (EHT) to any other terminal of CRT (Focus, G2, G1, cathodes or heaters). This phenomenon is most frequently when the tubes are new and it tends to disappear when the TV set has already worked during a time.

As a main measure to protect against the internal discharges, spark-gaps are incorporated into each terminal of the tube. These spark-gaps are located into the CRT socket. Its goal is conducting the biggest part of the discharge towards the aquadag of the tube, so the current goes by shortest and direct way.

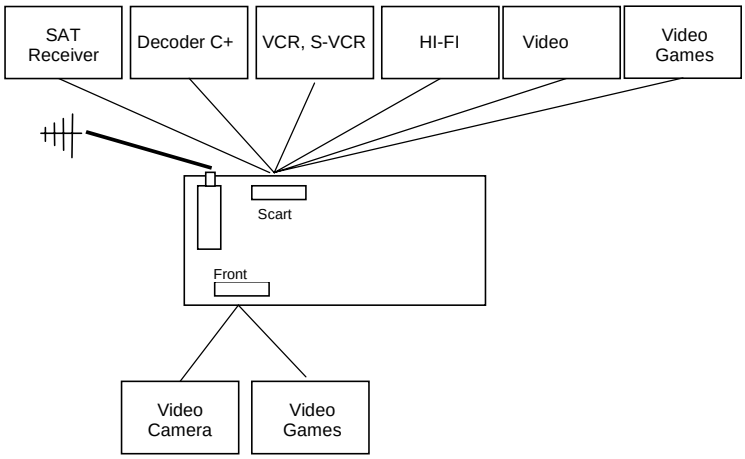
There are several types of CRT socket in the market. The differences between them can be in the spark-gaps position. That is why it is obvious to stand the importance out that if it is necessary to replace this connector, it will be used as a spare part what is in the components list of model.

The repercussions of mounting a wrong CRT socket are:

- Possible failure in CRT in case of discharge.
- Possible failure of chassis in case of discharge.
- Possible reduction of contrast due to a short-circuit of BCI signal with another points.

4.11 Peripheral connections to TV set.

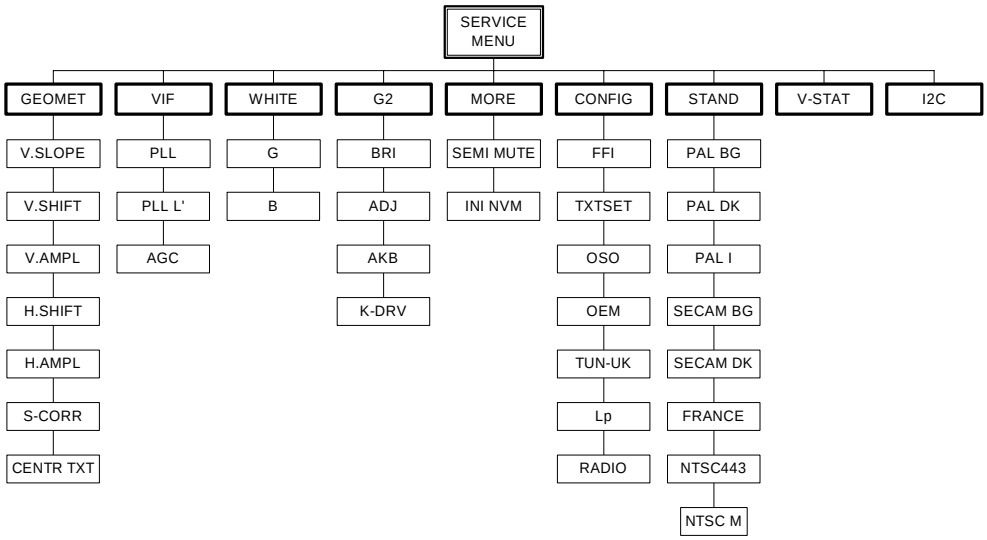
Possible configurations of peripherics and their recommended connection to Scart and frontal RCA of the TV set are detailed.



5. CONFIGURATION AND ADJUSTMENTS.

5.1 Service menu.

In order to accede to the service menu, press the key Vol – from TV local keyboard, and simultaneously pressing the green key or 2-digits key (-/--) from the remote control. There are the following options in this menu:



5.1.1 Service menu navigation.

The most important keys in the service menu are: Vol+ (scroll down submenus when they are and change the adjustments); Vol- (change the adjustments); P- (scroll the cursor down through the different options); P+ (scroll the cursor up through the different options); MENU (it shows the menu “SERVICE” if you are in a submenu or it exits from the menu “SERVICE” if you are inside) and numeric keys (they allow a direct access of the data when you are in an adjustment). Pressing any other key, you can exit from the service menu.

5.1.2 Meaning of each adjustment.

Adjustment	Meaning	Range	Initial value	Suggested value
GEOMET				
V.SLOPE	Ramp generator amplitude	0 to 63	40	
V.SHIFT	Vertical centre	0 to 63	32	
V.AMPL	Vertical amplitude	0 to 63	43	
H.SHIFT	Horizontal phase	0 to 63	37	
H.AMPL	Width	0 to 63	32	
S-CORR	Vertical S-correction	0 to 63	09	
CENTR TXT	OSD and TXT Centre	0 to 63	25	
VIF				
PLL	PLL of video IF	0 to 03	02	
PLL L'	PLL of video IF in L' system	0 to 03	02	
AGC	Automatic gain control	0 to 63	16	
WHITE				
G	White point, green gain	0 to 63	28	
B	White point, blue gain	0 to 63	26	
G2				
BRI	G2 adjust brightness level	0 to 63	50	
ADJ	Service Line Adjust	-	-	
AKB	Enable AKB servo	ON/OFF	ON	ON
K-DRV	RGB drive	0 to 7	02	02
MORE				
SEMI MUTE	Attenuation (dB) by pressing Mute once	0 to 63	12	
INI NVM	Non volatile memory initialisation	-	-	-
CONFIG				
FFI	PLL constant time of IF	ON/OFF	OFF	OFF
TXTSET	East countries selection	ON/OFF	OFF	OFF in continental models ON in export models
OSO	HV discharge mode	ON/OFF	OFF	OFF
OEM	TV set trademark	ON/OFF	OFF	OFF in models SANYO ON in models OEM
TUN-UK	Tuner selection for UK (only band UHF)	ON/OFF		OFF for no UK models. ON for UK models.
Lp	Enable of system L'.	ON/OFF		OFF in models without L'. ON in models with L'.
RADIO	Enable of radio.	ON/OFF		OFF in models without radio. ON in models with radio.
STANDARD				
PAL B/G	PAL B/G configuration	ON/OFF	ON	ON
PAL D/K	PAL D/K configuration	ON/OFF	OFF	OFF in models without D/K ON in models with D/K
PAL I	PAL I configuration	ON/OFF	OFF	OFF in models without system I ON in models with system I
SECAM B/G	SECAM B/G configuration	ON/OFF	OFF	OFF in PAL models ON in SECAM models
SECAM D/K	SECAM D/K configuration	ON/OFF	OFF	OFF
FRANCE	SECAM L configuration	ON/OFF	OFF	OFF in PAL models ON in SECAM L models
NTSC 443	NTSC 4.43MHz configuration	ON/OFF	ON	ON
NTSC M	NTSC 3,58MHz configuration	ON/OFF	OFF	OFF
V-STAT	Video processor status	-	-	
I2C BUS	I^2C Bus stop	-	-	

Note: The adjustment of width, H.AMPL, lacks effect whenever the circuit of adjustment is not mounted, which is optional, according to it has been indicated previously.

5.2 Adjustments.

ADJUSTMENT	SIGNAL	CONDITIONS	TEST POINT	ADJUSTMENT POINT	ADJUSTMENT PROCEDURE	INSTRUMENT
Power supply	Philips pattern	Picture: Normalised Sound: Minimum volume	B1 Cathode D850	VR800	Adjust to obtain: 106,5V ± 0.5V in CRTs Philips A34EAC01X06	Voltmeter DC Resolution >0,1V
A.G.C.	UHF Band – mid channel (e.g. 25)	Aerial signal level: 60dBuV (1mVrms)	Pin 1 of TU250 (AGC)	SERVICE/VIF/AGC	Adjust to obtain 3,0±0,5V	Voltmeter DC Resolution >0,1V
G2	Philips pattern	SERVICE/G2/BRI: 50 for Philips CRT A34EAC01X06	CRT Screen	SERVICE/G2/ADJ SCREEN Potentiometer	Adjust just to see the service line	Visual adjustment
Focus	Philips pattern	Picture: Normalised	CRT Screen	FOCUS Potentiometer	Adjust to obtain the best possible focusing in lateral of screen.	Visual adjustment
Vertical slope	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/GEOMET>/V.SLOPE	Adjust to achieve that the centre horizontal line matches the beginning of the service blanking.	Visual adjustment
Vertical centre	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/GEOMET>/V.SHIFT	Adjust to centre the picture in vertical direction	Visual adjustment
Height	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/ GEOMET>/V.AMPL	Adjust just to get the checked board hidden.	Visual adjustment
Horizontal centre	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/ GEOMET>/H.SHIFT	Adjust to centre the picture in horizontal direction.	Visual adjustment
Width	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/ GEOMET>/H.AMPL	Adjust just to get the checked board hidden.	Visual adjustment
White point	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/WHITE/G SERVICE/WHITE/B	Adjust to obtain a white tone acceptable.	Visual adjustment
TXT centre	Philips pattern	Picture: Normalised	CRT Screen	SERVICE/GEOMETCENTR TXT	Adjust to centre the OSD in the screen.	Visual adjustment

Common condition to all adjustments (except AGC): The aerial signal level must be acceptable (the picture doesn't present snow degradation).
Width adjustment, H.AMPL, lacks effect whenever the circuit of adjustment is not mounted, which is optional, according to it has been indicated previously.

6. SPECIAL MODES AND PROCEDURES.

6.1 Secam B/G – L adaptation.

In order to form a PAL B/G TV set without radio, so that also it can receive transmissions SECAM B/G and L, the following modification is due to make:

GENERAL PCB

Location	COMPONENTS THAT ARE ANNULLED		COMPONENTS THAT ARE ADDED	
	Part No.	DESCRIPTION	Part No.	DESCRIPTION
C1400			0230360406	Ceramic SMD 1000 PF.10% 50V.0805
C1401			0230600603	Ceramic SMD 100 NF. +80-20% 25V.
C1402			0250320769	Electrolytic 10 MF. 16V. R-5
C1403			0230480600	Ceramic SMD 10 NF. +80-20% 50V.
C1404			0250280864	Electrolytic 4,7 MF. 25V. R-5
C1405			0250280864	Electrolytic 4,7 MF. 25V. R-5
C1406			0230600603	Ceramic SMD 100 NF. +80-20% 25V.
C1407			0230360406	Ceramic SMD 1000 PF.10% 50V.0805
C1408			0230740003	Ceramic SMD 2,2 MF. 10V. +80-20%
C1409			0230740003	Ceramic SMD 2,2 MF. 10V. +80-20%
C1410			0230740003	Ceramic SMD 2,2 MF. 10V. +80-20%
C1411			0230360406	Ceramic SMD 1000 PF.10% 50V.0805
C1412			0230740003	Ceramic SMD 2,2 MF. 10V. +80-20%
C1413			0230740003	Ceramic SMD 2,2 MF. 10V. +80-20%
C208			0230740003	Ceramic SMD 2,2 MF. 10V. +80-20%
C404			0230640401	Ceramic SMD 220 NF. 10% 16V.0805
D1200			0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
D251			0360601512	Diode SMD LS4148
IC1400			0360514806	SMD Integrated Circuit TDA9830T V1
IC1401			0360148209	SMD Integrated Circuit HEF 4052BT
IC400	0360514509	Integrated Circuit TDA8841N2	0360515001	Integrated Circuit TDA 8842 N2
J224			0470040007	Jumper LEAD 0,6 MM.
J241			0470040007	Jumper LEAD 0,6 MM.
J242			0470040007	Jumper LEAD 0,6 MM.
J243			0470040007	Jumper LEAD 0,6 MM.
J246			0470040007	Jumper LEAD 0,6 MM.
J251			0470040007	Jumper LEAD 0,6 MM.
J297			0470040007	Jumper LEAD 0,6 MM.
J300			0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J306			0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
J343			0470040007	Jumper LEAD 0,6 MM.
JO1151			0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JO1401			0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
JO400	0790701106	R.M.G. SMD 0 Ω 1/10W.		
JO401	0790701106	R.M.G. SMD 0 Ω 1/10W.		
L1401			0090319229	Peaking COIL 4,7 UH. 10%
L251	0090316845	Peaking COIL 1UH 10% radial	0090317140	Peaking COIL 0,39 UH. 20% RADIAL
Q1400			0360320410	SMD BF 570
Q1401			0360320600	BRT SMD PDTC124ET SOT-23
Q1404			0360320022	SMD BC 848 B
Q853	0360306104	Transistor 2SB 764 E	0360173504	TIP 32 C
R126			0790239008	R.M.G. SMD 1 KΩ 5% 1/10W. 0805
R128			0790239008	R.M.G. SMD 1 KΩ 5% 1/10W. 0805
R1401			0790229009	R.M.G. SMD 150 Ω 5% 1/10W. 0805
R1402			0790243000	R.M.G. SMD 2,2 KΩ 5% 1/10W. 0805
R1403			0790741805	R.M.G. SMD 1,5 KΩ 5% 1/10W. 0805
R1404			0790846109	R.M.G. SMD 220 Ω 5% 1/10W. 0805
R1406			0790243000	R.M.G. SMD 2,2 KΩ 5% 1/10W. 0805
R1411			0790247001	R.M.G. SMD 4,7 KΩ 5% 1/10W. 0805
R1412			0790245005	R.M.G. SMD 3,3 KΩ 5% 1/10W. 0805
R1415			0790259006	R.M.G. SMD 47 KΩ 5% 1/10W. 0805
R1417			0790259006	R.M.G. SMD 47 KΩ 5% 1/10W. 0805
R1418			0790256002	R.M.G. SMD 27 KΩ 5% 1/10W. 0805
R1419			0790239008	R.M.G. SMD 1 KΩ 5% 1/10W. 0805
R251			0790701106	R.M.G. SMD 0 Ω 1/10W. 0805

Location	COMPONENTS THAT ARE ANNULLED		COMPONENTS THAT ARE ADDED	
	Part No.	DESCRIPTION	Part No.	DESCRIPTION
R262	0790701106	R.M.G. SMD 0 Ω 1/10W.	0790251003	R.M.G. SMD 10 KΩ 5% 1/10W. 0805
R928	0790251003	R.M.G. SMD 10KΩ 5% 1/10W	0790749402	R.M.G. SMD 6,8 KΩ 5% 1/10W. 0805
R929	0790251003	R.M.G. SMD 10KΩ 5% 1/10W	0790749402	R.M.G. SMD 6,8 KΩ 5% 1/10W. 0805
R931	0790151500	Carbon Res. 10KΩ 5% 1/6W	0790149405	Carbon Resistor 6,8 KΩ 5% 1/6W.
SF1400			0090405101	SAW Filter L9360M
SF250			0090413600	Ceramic Filter MKT40.4MA110P
TU250	0850102617	Tuner UV1315/AI-2	0850103201	Tuner UV1315/S I-2

After making the modification it is necessary to enter the Service Menu, STANDARD sub-menu, in order to change options SECAM BG and FRANCE to “ON”. See Service Menu.
To be able to make the semiautomatic or manual tuning in SECAM L system, it is necessary that the user selects " System FRANCE " in the Tuning Menu before starting the search, since the detection of this system is not automatic. If the automatic tuning search is made, the TV set will search all the broadcastings in two sweepings, one of them with " System FRANCE ".

6.2 NTSC M (NTSC 3, 579545) adaptation.

In order to form a TV set so that it can receive signal NTSC M (NTSC3, 579545) it must make the following modification:

PCB GENERAL

Loc.	COMPONENTS THAT ARE ANNULLED		COMPONENTS THAT ARE ADDED	
	Part No.	DESCRIPTION	Part No.	DESCRIPTION
X401			0090122409	Quartz Crystal 3,579545 MHz.
C436			0230150229	Ceramic SMD 18 PF. 1% 50V.

After making the modification, it is necessary to enter the Service Menu, STANDARD sub-menu, to change option NTSC M to “ON”. Now, TV set is prepared to receive NTSC M signals by means of euroconnector or frontal AV (not by means of aerial).

6.3 Procedure of substitution of microprocessor IC100.

The run pilot production began with micros version OTP (One Time Programmable). These micros are different from those of the mask. They are clearly identifiable, since version OTP incorporates a sticky label.
The basic difference between both types is: the OTP the level of RGB outputs is 0.2V higher than the rest of versions.

6.3.1 TV sets without TXT: OTP replacement with a mask.

The microprocessor OTP has 56 pins, whereas the one of the mask has 42 pins. In the silk screen is indicated clearly how 42 pins micro must be mounted.
In case of damaging a micro OTP (version without TXT) it should be replaced by another type mask. For that, it is necessary to make the following changes:

GENERAL PCB

Loc.	COMPONENTS THAT ARE ANNULLED		COMPONENTS THAT ARE ADDED	
	Part No.	DESCRIPTION	Part No.	DESCRIPTION
C100	0230600504	Cer. SMD 100 nF. 10% 25V.		
C107	0230600603	Cer. SMD 100nF.+80-20% 25V		
C117	0790701106	R.M.G. SMD 0 Ω 1/10W.	0230160327	Ceramic SMD 22 PF. 1% 50V. 0805
C118			0230440125	Ceramic SMD 4700 PF.10% 50V.0805
C119	0230440125	Cer. SMD 4700 PF.10% 50V.		
C120	0230160327	Cer. SMD 22 PF. 1% 50V.		
D103	0360606511	SMD Diode Zener BZT55C2V7	0790701106	R.M.G. SMD 0 Ω 1/10W. 0805
IC100	0360516405	I.Circuit ST92T195B7B1/EBL	0360516702	Integrated Circuit ST92185B1B1
R107	0790248009	R.M.G. SMD 5,6KΩ 5% 1/10W.		
R123			0790248009	R.M.G. SMD 5,6 KΩ 5% 1/10W. 0805

6.3.2 TV sets with TXT: OTP replacement with a mask.

The micro OTP has 56 pins, like the one of the mask. In case of damaging a micro OTP (version with TXT) it should be replaced by another type mask. For that, it is necessary to make the following changes:

GENERAL PCB

Loc.	COMPONENTS THAT ARE ANNULLED		COMPONENTS THAT ARE ADDED	
	Part No.	DESCRIPTION	Part No.	DESCRIPTION
D103	0360606511	SMD Diode Zener BZT55C2V7	0790701106	R.M.G. SMD 0 OHM 1/10W. 0805
IC100	0360516405	I.Circuit ST92T195B7B1/EBL	0360516603	I. Circuit ST92195B1B1

6.4 Initial auto tuning setting.

There are two methods to rehabilitate the initial autotuning. If it is had a Factory remote control, it is enough with pressing the key ' NORM', that in addition it will recover the adjustments normalization and it will leave the TV in normal mode (neither Hotel nor Factory). If it has not this remote control, the procedure should be:

Enter in Tuning menu

Selection AUTO mode and start the search.

Exit Tuning menu, switching off the TV or pressing any key before it found the first channel (it is possible to remove the aerial).

Next time TV set switched on, it will appear the welcome message and it will start the automatic tuning of channels. This function will be cancelled when a channel is memorised, so much automatic as manually.

6.5 Procedure of non-volatile memory substitution.

When starting the television set, the microprocessor will always verify if non-volatile memory or NVM (IC125) is initialised or not. In case of not being, it will come to start the television set with a minimum of values by defect to guarantee a correct start-up.

The following step to make by the technician after the substitution by failure of the NVM, it will be to accede to the Service Menu and a complete initialisation of the NVM. For it, it is necessary to enter in “MORE” submenu and being in “INI NVM”, press “VOL +” to confirm. Later, the definitive manual configuration of the adjustments will be done as it is indicated in "Service Menu".

Warning: when the NVM is initialised it removes the data contained in the NVM to load those that the microprocessor has by default; therefore, it is obligatory to introduce again the configuration data (CONFIG), standards (STANDARD) and the adjustments of Service Menu (not manual adjustments, see “Adjustments”). For that reason, it is better not re-initialise the NVM if it is not strictly necessary, as it is in the case of substitution of IC125.

6.6 “Factory” mode description.

The " Factory " mode is a special operation way of TV set, thought to facilitate its manufacture and it is identified on screen with label " FAC". This mode is not intended to be used by the end user. The differences of functioning with respect to the normal mode are:

The TV does not switch to stand-by mode by none reason, neither by order of user, nor by timing... but it always remains switched on.

The adjustments that are made by the user (volume, contrast, etc...) operate much more quickly.

Blue-Back remains disabled.

“Comestic” delays are avoided in the start-up of TV set.

Audio and video mutes are avoided in changes of programmes and in the rest of switchings.

To quit the "Factory" mode, it must enter and quit the clock menu in the OSD of the user. TV sets are manufactured in “normal” mode, but in case a TV set was in “Factory" for some circumstance, It is necessary to set the TV in normal mode.

6.7 Description of “Hotel” and “Rental” modes.

This mode of working is thought for its use in hotels, hospitals and another public establishments. Its goal is to avoid the user change the basic adjustments of TV set. Its features are:

Maximum volume is limited to the level that already exists when the mode is enable.

There is no access to Tuning menu of channels (neither fine-tuning nor swapping, …).

The TV set always boots with values of normalization and it is not allowed the adjustment from the user was memorised.

There is an access neither the language selection or child lock.

It is possible to be forced that the TV set always switch on in a certain program (between 1 and 8) or in AV1.

In order to enable this mode, hold the ‘Vol-‘ key from the local keyboard pressed and press ‘Recall’ on the remote control. A message like “ HOTEL: 00 “ will be shown, waiting for the input of two digits. Themeaning of these digits are:

First digit:
'0': normal mode
'1': HOTEL mode
'2': RENTAL mode
Second digit:
'0': It switches on into the same channel as it was switched off (normal mode).
'1' to '8': It switches on into the selected programme (1 to 8).
'9': It switches on into AV1
The 'RENTAL' mode has the same features as the 'HOTEL' mode and, additionally, the keys of the local keyboard are inhibited, so it is only possible to change the programme with the remote control. In order to quit this mode, the colour saturation, it is necessary to set the saturation colour level to 0.

7. FAILURE LOCATION

7.1 Introduction.

So that the repairing of chassis is more reasonable, it has been included a system of failure signal code by means of the led. This diagnosis along with the failure location flow-charts facilitate its repairing.

7.2 The start-up procedure.

The procedure of the microprocessor in order to start-up the TV set is the following:

1. When the –RESET signal (pin 2 of IC100) is a low level, the microprocessor starts to work.
2. A delay of 750msec. is added. This delay is included in order to minimise the overheating of some components, in case of short-circuits provokes a RESET before enabling the protections.
3. It accedes to non-volatile memory (IC125) to read the last state in which the TV set was.
4. If the reading is STAND_BY, it will remain in STAND_BY mode, waiting for some order from the user. If the reading is ON, the start-up procedure will go on.
5. ON signal is enabled (pin 3 of IC100)
6. If –SUP-FAIL signal (pin 9 of IC100) does not raise to a high level before 200msec. Signal ON is disabled and it is shown a failure of the supply (ERROR_4)
7. Video processor starts. If there is no answer, it will be shown ERROR_1.
8. HOUT signal is enabled (pin 40 of IC400), at which the deflections are started. If there are anomalies, it will appear ERROR_2 or ERROR_3.
9. The corresponding channel is tuned and the Mute signal is disabled (pin 52 of IC100).
10. It waits until the heaters are enough hot. The microprocessor knows it by monitoring a bit of video processor related to the Cathode self-calibration servo (AKB).
11. A delay of 500msec. is added to guarantee the picture stability.
12. RGB signals are enabled.

7.3 Protections.

The microprocessor checks different parts from the circuit periodically. If some part that affects the safety of the circuit fails, then the microprocessor changes the TV set into protection mode, by setting power supply into STAND-BY mode. Then, the error is indicated by means of the LED (reason) that it has caused the entrance into protection mode.

7.4 Indication of errors (LED blinking).

The LED carries out a cycle of N blinking when it enters protection mode. Counting the number of times that the LED blinks, the indication of Error can be identified.
In the following table the different conditions of error are enumerated:

Error	Meaning
ERROR_1	Video processor does not answer
ERROR_2	Vertical deflection failure.
ERROR_3	Horizontal deflection failure.
ERROR_4	Short-circuit into the power supply.
ERROR_6	Non-volatile memory does not answer
ERROR_11	General failure of I2C bus.

The I2C bus reads the errors 1, 2 and 6. Error 3 is enabled by means of the signal - DEFL_FAIL (pin 14 of IC100) and error 4 by the signal - SUP_FAIL (pin 9 of IC100). Error 11 enables according to the state of the lines SDA, SCL.

7.5 Possible causes of entering in protection mode

Next, some of main problems that can cause that the chassis goes to ERROR_N are:

ERROR_1:

Fault in the supply of +8V from the microprocessor.
Non-continuity of I2C bus between IC100 and IC400.
IC400 damaged.

ERROR_2:

Fault in any supply from ±12V.
Vertical deflection open or short-circuited.
IC701 damaged.
Vertical ramp generator of IC400 damaged.
Fault in path between IC400 and IC701.
C656 open.

ERROR_3:

Short or open circuited heaters.
Short-circuit in some secondary of T650.
Q650 damaged.
Driver stage does not work correctly.
Short-circuit from cathode to ground.

ERROR_4:

Overconsumption in the power supply.
General failure in voltage regulators.

ERROR_6:

IC125 damaged.

ERROR_11:

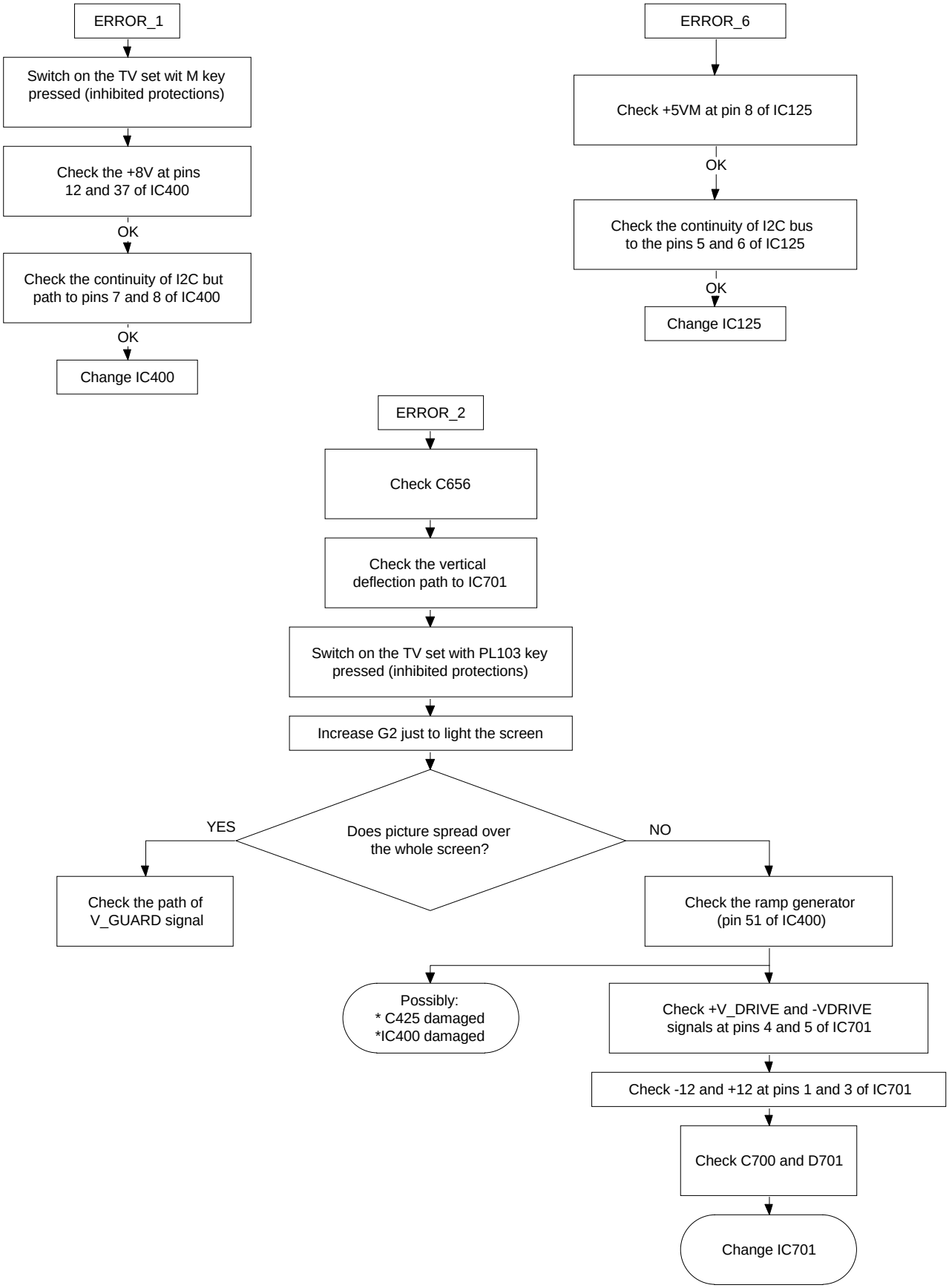
Generic error of I2C bus.

7.6 Protection inhibition.

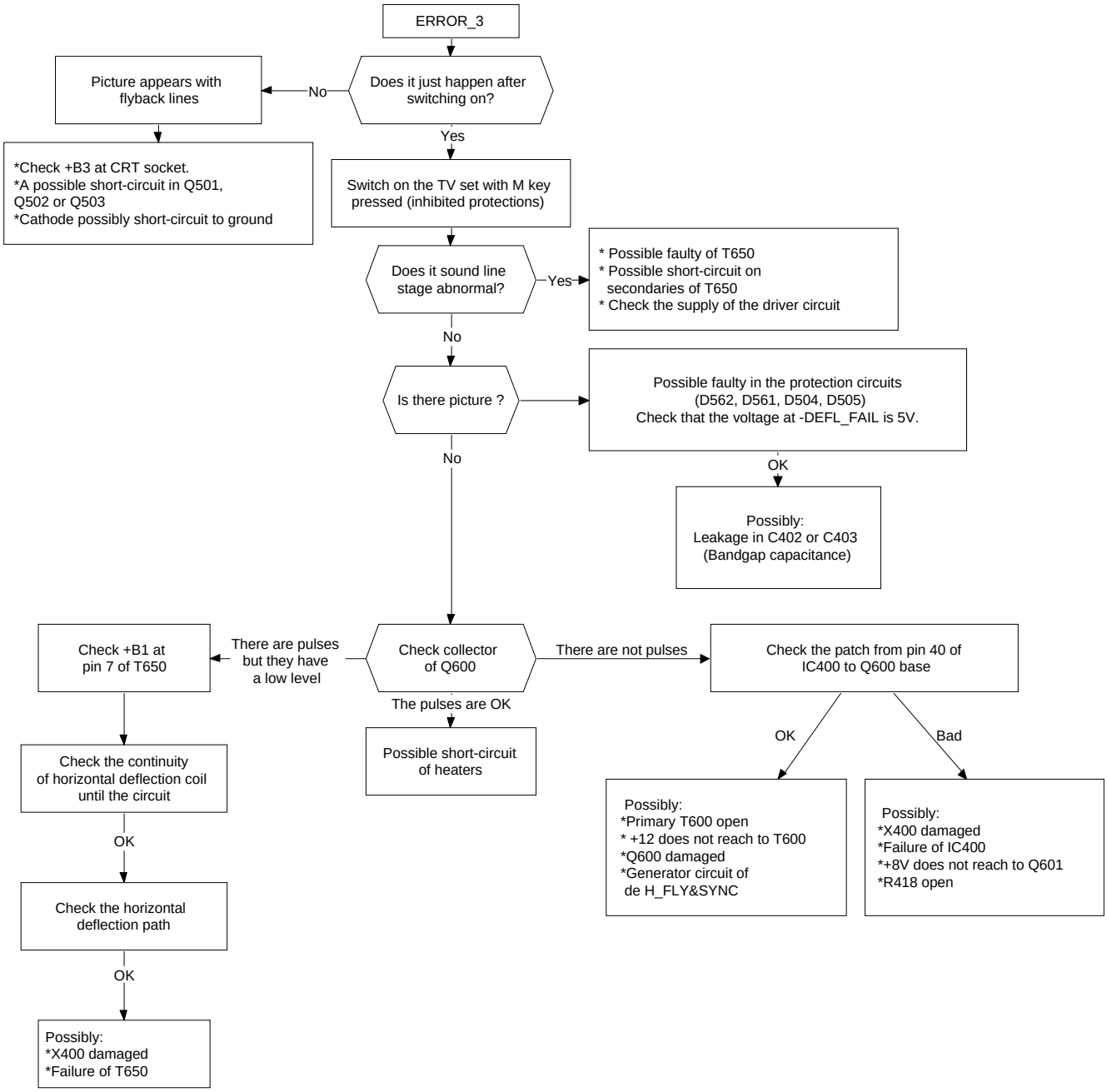
In order to facilitate the repair of TV set, it is possible to disable the protections keeping pressed the M (PL103) key. In that case, although the microprocessor detects a failure, it does not set the source to STAND_BY.

7.7 Failure location flow-charts.

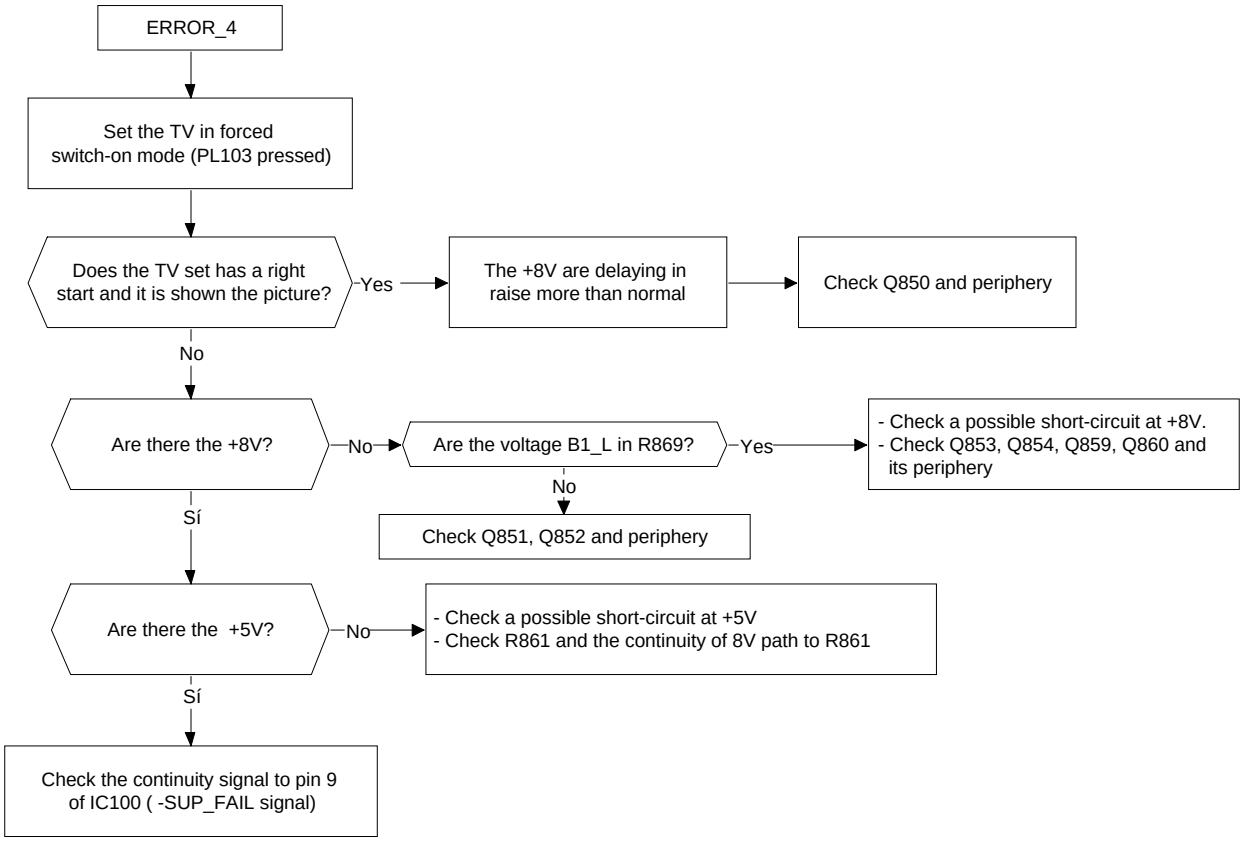
7.7.1 Errors 1, 2 and 6.


ERROR_1
Switch on the TV set wit M key pressed (inhibited protections)
Check the +8V at pins 12 and 37 of IC400
OK
Check the continuity of I2C but path to pins 7 and 8 of IC400
OK
Change IC400
ERROR_6
Check +5VM at pin 8 of IC125
OK
Check the continuity of I2C bus to the pins 5 and 6 of IC125
OK
Change IC125
ERROR_2
Check C656
Check the vertical deflection path to IC701
Switch on the TV set with PL103 key pressed (inhibited protections)
Increase G2 just to light the screen
Does picture spread over the whole screen?
YES
NO
Check the path of V_GUARD signal
Check the ramp generator (pin 51 of IC400)
Possibly:
* C425 damaged
*IC400 damaged
Check +V_DRIVE and -VDRIVE signals at pins 4 and 5 of IC701
Check -12 and +12 at pins 1 and 3 of IC701
Check C700 and D701
Change IC701

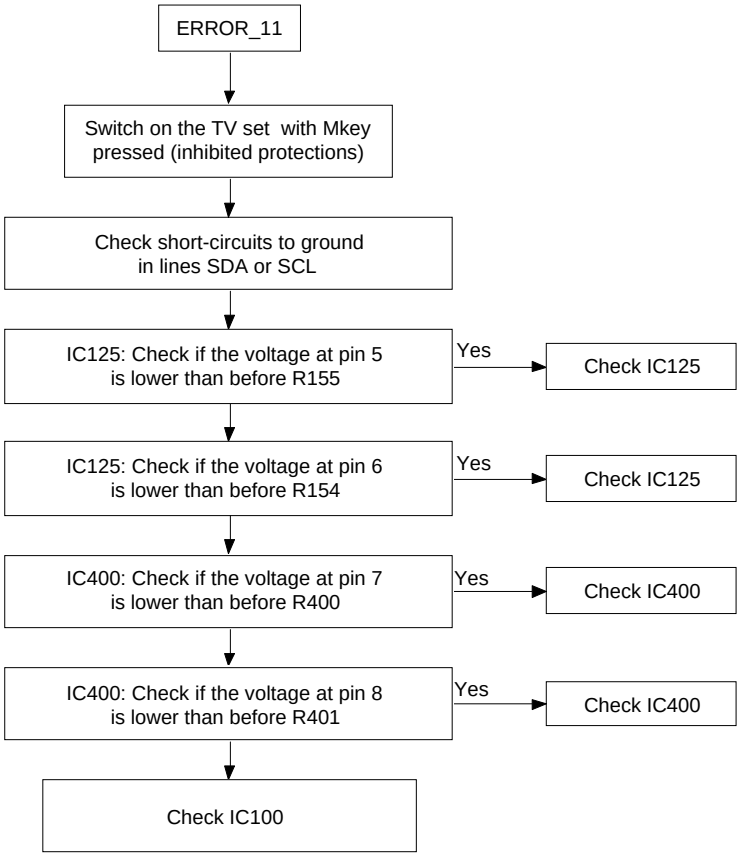
7.7.2 Error 3.


ERROR_3
Does it just happen after switching on?
No
Picture appears with flyback lines
*Check +B3 at CRT socket.
*A possible short-circuit in Q501, Q502 or Q503
*Cathode possibly short-circuit to ground
Yes
Switch on the TV set with M key pressed (inhibited protections)
Does it sound line stage abnormal?
Yes
* Possible faulty of T650
* Possible short-circuit on secondaries of T650
* Check the supply of the driver circuit
No
Is there picture ?
Possible faulty in the protection circuits (D562, D561, D504, D505)
Check that the voltage at -DEFL_FAIL is 5V.
OK
Possibly:
Leakage in C402 or C403
(Bandgap capacitance)
No
Check collector of Q600
There are pulses but they have a low level
Check +B1 at pin 7 of T650
Check the continuity of horizontal deflection coil until the circuit
OK
Check the horizontal deflection path
OK
Possibly:
*X400 damaged
*Failure of T650
The pulses are OK
Possible short-circuit of heaters
There are not pulses
Check the patch from pin 40 of IC400 to Q600 base
OK
Bad
Possibly:
*Primary T600 open
* +12 does not reach to T600
*Q600 damaged
*Generator circuit of de H_FLY&SYNC
Possibly:
*X400 damaged
*Failure of IC400
*+8V does not reach to Q601
*R418 open

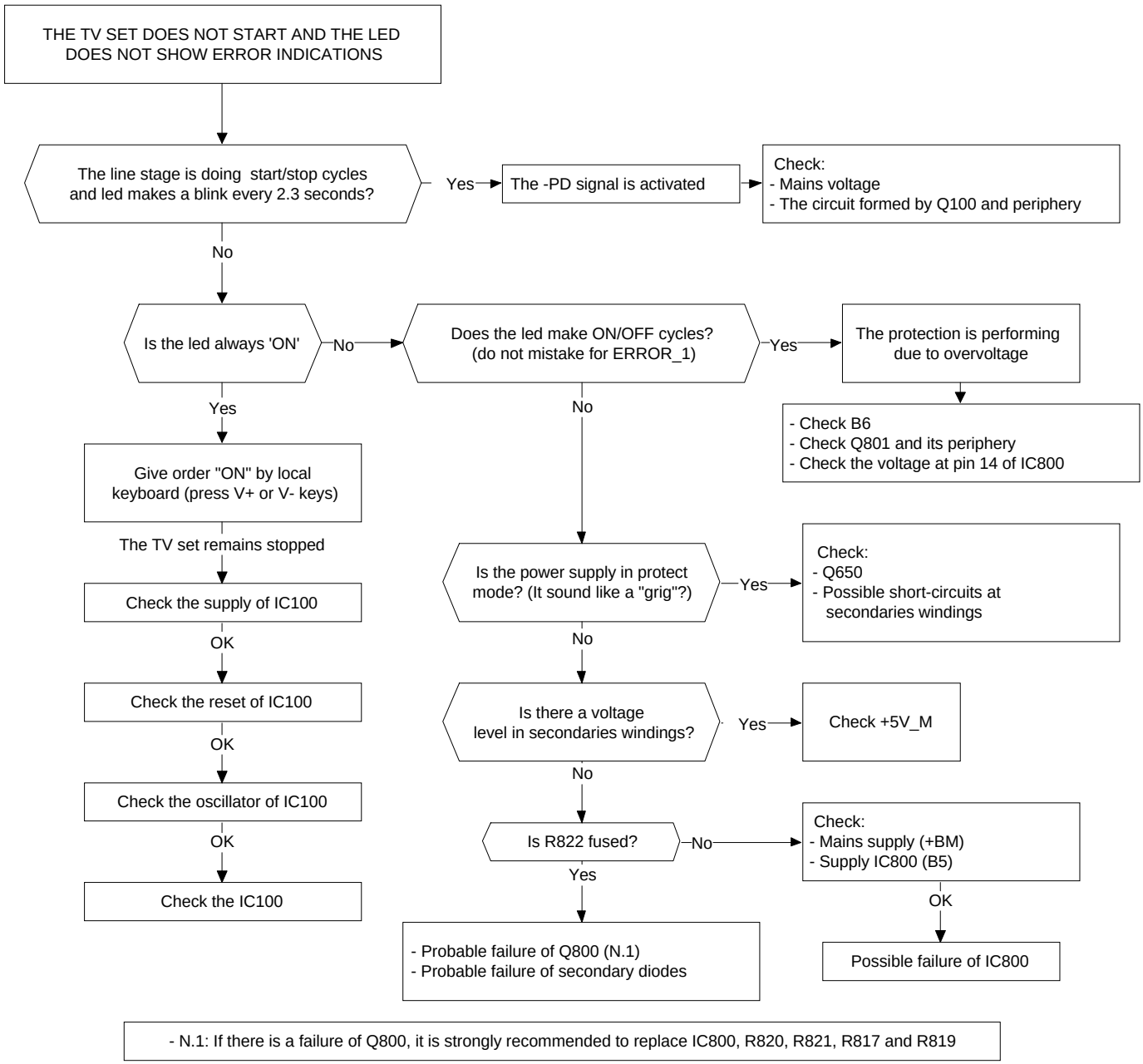
7.7.3 Error 4.


ERROR_4
Set the TV in forced switch-on mode (PL103 pressed)
Does the TV set has a right start and it is shown the picture?
Yes
The +8V are delaying in raise more than normal
Check Q850 and periphery
No
Are there the +8V?
No
Are the voltage B1_L in R869?
Yes
- Check a possible short-circuit at +8V.
- Check Q853, Q854, Q859, Q860 and its periphery
No
Check Q851, Q852 and periphery
Sí
Are there the +5V?
No
- Check a possible short-circuit at +5V
- Check R861 and the continuity of 8V path to R861
Sí
Check the continuity signal to pin 9 of IC100 (-SUP_FAIL signal)

7.7.4 Error 11.


ERROR_11
Switch on the TV set with Mkey pressed (inhibited protections)
Check short-circuits to ground in lines SDA or SCL
IC125: Check if the voltage at pin 5 is lower than before R155
Yes
Check IC125
IC125: Check if the voltage at pin 6 is lower than before R154
Yes
Check IC125
IC400: Check if the voltage at pin 7 is lower than before R400
Yes
Check IC400
IC400: Check if the voltage at pin 8 is lower than before R401
Yes
Check IC400
Check IC100

7.7.5 No error indication.


THE TV SET DOES NOT START AND THE LED DOES NOT SHOW ERROR INDICATIONS
The line stage is doing start/stop cycles and led makes a blink every 2.3 seconds?
Yes
The -PD signal is activated
Check:
- Mains voltage
- The circuit formed by Q100 and periphery
No
Is the led always 'ON'
No
Does the led make ON/OFF cycles? (do not mistake for ERROR_1)
Yes
The protection is performing due to overvoltage
- Check B6
- Check Q801 and its periphery
- Check the voltage at pin 14 of IC800
Yes
No
Give order "ON" by local keyboard (press V+ or V- keys)
The TV set remains stopped
Check the supply of IC100
OK
Check the reset of IC100
OK
Check the oscillator of IC100
OK
Check the IC100
Is the power supply in protect mode? (It sound like a "grig"?)
Yes
Check:
- Q650
- Possible short-circuits at secondaries windings
No
Is there a voltage level in secondaries windings?
Yes
Check +5V_M
No
Is R822 fused?
No
Check:
- Mains supply (+BM)
- Supply IC800 (B5)
Yes
OK
- Probable failure of Q800 (N.1)
- Probable failure of secondary diodes
Possible failure of IC800
- N.1: If there is a failure of Q800, it is strongly recommended to replace IC800, R820, R821, R817 and R819

8. GLOSSARY OF TERMS

ABL: Auto Beam Limiter. Circuit for limiting the beam current.
AFC: Automatic frequency control.
AGC: Auto Gain Control. Voltage that controls the gain of the tuner.
AKB: Automatic control of beam cathode.
B/G: TV system. Audio carrier is 5,5MHz. above the video carrier.
BANDGAP: Voltage reference.
BCI: Beam Current Information. Voltage which is directly proportional to beam current.
BCL: See ABL. BCL also refers to the low-pass filtered BCI signal.
CUTOFF: The point in which the beam current disappears.
CVBS: Video signal and synchronism.
CHROMA: Chrominance signal.
D/K: TV system. Audio carrier is 6,5MHz. above the video carrier.
DRIVER: Circuit that attacks the base of line transistor.
EEPROM: Non volatile memory.
EMC: Electromagnetic compatibility.
Fh: Horizontal frequency.
FLOF: TXT page navigation by colour links.
FLYBACK: Signal produced in the line transistor connector during the return of the beam sweeping. It is also called flyback to the time lapse of the beam return.
HEATER: CRT cathode heating filaments.
I: TV system. Audio carrier is 6MHz above the video carrier.
I2C: Serial communication bus with two lines, SDA for data and SCL for clock.
IF: Intermediate frequency.
IR: Infrared.
L: French TV system. Positive video modulation and AM sound.
L': Same as L but with inverted signal spectrum.
LIST: Definition of preferred TXT pages by the user.
MUTE: Audio mute or video signal blanking.
NVM: Non volatile memory.
OSD: On Screen Display. Pictures generated by the microprocessor.
PLL: Phase locked loop.
PWM: Pulse width modulation.
SCART: Euroconnector.
SIF: Sound intermediate frequency.
SMPS: Switched mode power supply.
TRC: Cathode ray tube.
VCO: Voltage controlled oscillator.
Y: Luminance signal.

Note: All information in this manual is correct at the start of production. SANYO reserves its right to modify components and procedures in order to comply with its continuous improvement policy.

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